www.numerons.in

5. Application of Psychology to Educational Field:

Psychological principles underlying effective teaching-learning process; Learning styles; Gifted, retarded, learning disabled and their training; Training for improving memory and better academic achievement; Personality development and value education, Educational, vocational guidance and career counseling; Use of psychological tests in educational institutions; Effective strategies in guidance programmes.

www.numerons.in

www.numerons.in

Topics	Page Number
Educational psychology	5
Educational technology	21
Cognitive tutor	29
Intelligent tutoring system	29
William Winn	31
Instructional theory	34
Instructional design	35
Instructional technology	40
Constructive alignment	46
Bloom's Taxonomy	47
Mastery learning	53
Evolutionary educational psychology	54
ADDIE Model	57
Blended learning	59
Instructional Simulation	66
Mind map	74
Information mapping	79
Programmed instruction	80
Rubric (academic)	81
Learning styles	84
Cognitive style	94
Cognitive Styles Analysis	96
Learning sciences	97
Learning theory (education)	99
Visual learning (Learning Style)	103
Auditory learning (Learning Style)	107
Kinesthetic learning (Learning Style)	109
Learning Methods	111
Cooperative learning	111
Collaborative learning	114
Problem-based learning	117
Discovery learning	120
Inquiry-based learning	122
Project-based learning	126
Computer-supported collaborative learning	132
Robert Sternberg	137
Learning by teaching	140
Intellectual giftedness	146
Genius	158
Child prodigy	163
Late bloomer	165

www.numerons.in
www.numerons.in
www.numerons.in

Whiz kid 174
Multipotentiality 175
Gifted At-Risk 175
Marland report 177
Underachiever 178
Gifted education 178
Rationale for gifted programs 193

Learning disability 195
Learning Disorders 207
Dysgraphia 207
Nonverbal learning disorder 209
Auditory processing disorder 211
Language-based learning disability 215
Primary and secondary gain 217
Disorder of written expression 217
Reading disability 218
Expressive language disorder 219
Dyscalculia 220
Acalculia 222
Ageometresia 223
Developmental dyspraxia 223
Dyslexia 228
Speech disorder 240
Scotopic sensitivity syndrome 242
Mental retardation 248
Attention deficit hyperactivity disorder 259
Savant syndrome 277
Asperger syndrome 280
Autism 292
Pivotal response therapy 311
TEACCH 313
Floortime 316
Special education 317
Alternative therapies for learning disabilities 331
Learning Disability Coalition 333

Personal development 334
Positive Disintegration 341
Self-help 355
Human Potential Movement 359

Education reform 361
Positive education 374
Progressive education 380
Constructionism (learning theory) 385

www.numerons.in

Democratic education 387
Humanistic education 395
Liberal education 396
Sudbury school 399
Positive behavior support 400
Student voice 405
Higher-order thinking 409
Time-out (parenting) 411
Child discipline 412
Blanket training 419
School discipline 419
Tactical ignoring 422
Classroom management 423
Neuro-linguistic programming 427
The Institutes for the Achievement of Human Potential 435

E-learning 440
Flexible learning 450
Virtual learning environment 451
MLearning 456
Learning management system 463

www.numerons.in

www.numerons.in

www.numerons.in

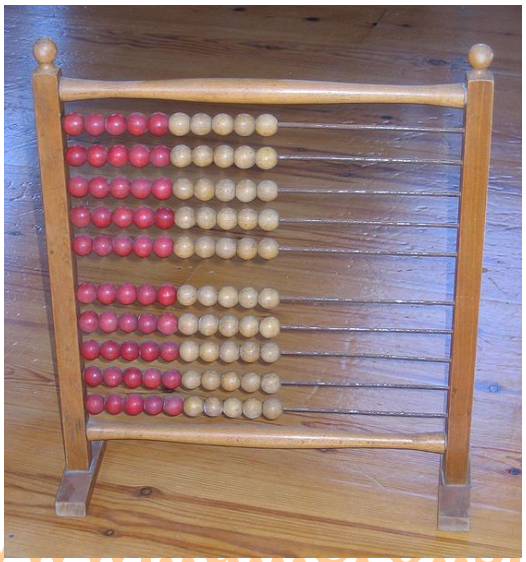
Educational psychology

Educational psychology is the study of how humans learn in educational settings, the effectiveness of educational interventions, the psychology of teaching, and the social psychology of schools as organizations. Educational psychology is concerned with how students learn and develop, often focusing on subgroups such as gifted children and those subject to specific disabilities. Although the terms "educational psychology" and "school psychology" are often used interchangeably, researchers and theorists are likely to be identified in the US and Canada as educational psychologists, whereas practitioners in schools or school-related settings are identified as school psychologists. This distinction is however not made in the UK, where the generic term for practitioners is "educational psychologist."

Educational psychology can in part be understood through its relationship with other disciplines. It is informed primarily by psychology, bearing a relationship to that discipline analogous to the relationship between medicine and biology. Educational psychology in turn informs a wide range of specialities within educational studies, including instructional design, educational technology, curriculum development, organizational learning, special education and classroom management. Educational psychology both draws from and contributes to cognitive science and the learning sciences. In universities, departments of educational psychology are usually housed within faculties of education, possibly accounting for the lack of representation of educational psychology content in introductory psychology textbooks.

www.numerons.in

Social, moral and cognitive development



An abacus provides concrete experiences for learning abstract concepts

To understand the characteristics of learners in childhood, adolescence, adulthood, and old age, educational psychology develops and applies theories of human development. Often

represented as stages through which people pass as they mature, developmental theories describe changes in mental abilities (cognition), social roles, moral reasoning, and beliefs about the nature of knowledge.

For example, educational psychologists have researched the instructional applicability of Jean Piaget's theory of development, according to which children mature through four stages of cognitive capability. Piaget hypothesized that children are not capable of abstract logical thought until they are older than about 11 years, and therefore younger children need to be taught using concrete objects and examples. Researchers have found that transitions, such as from concrete to abstract logical thought, do not occur at the same time in all domains. A child may be able to think abstractly about mathematics, but remain limited to concrete thought when reasoning about human relationships. Perhaps Piaget's most enduring contribution is his insight that people actively construct their understanding through a self-regulatory process.

www.numerons.in

Piaget proposed a developmental theory of moral reasoning in which children progress from a naïve understanding of morality based on behavior and outcomes to a more advanced understanding based on intentions. Piaget's views of moral development were elaborated by Kohlberg into a stage theory of moral development. There is evidence that the moral reasoning described in stage theories is not sufficient to account for moral behavior. For example, other factors such as modeling (as described by the social cognitive theory of morality) are required to explain bullying.

Rudolf Steiner's model of child development interrelates physical, emotional, cognitive, and moral development in developmental stages similar to those later described by Piaget.

www.numerons.in

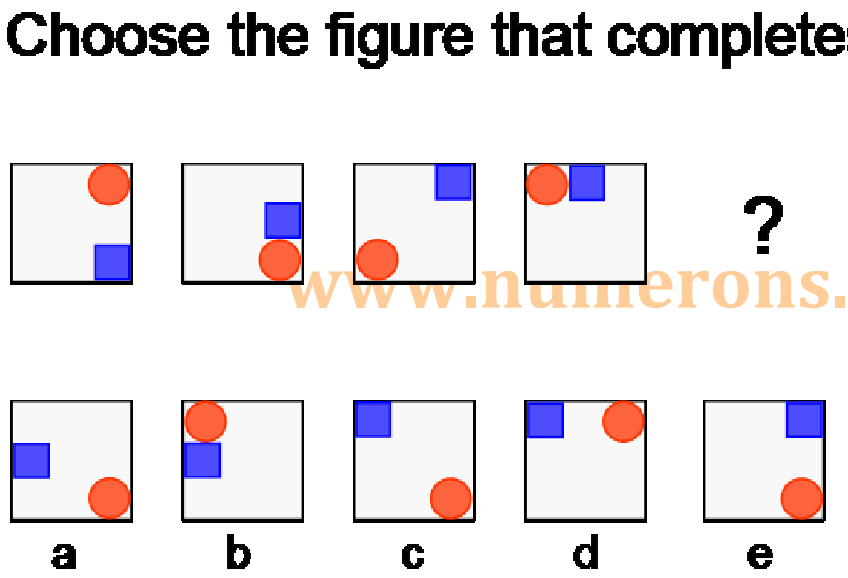
Developmental theories are sometimes presented not as shifts between qualitatively different stages, but as gradual increments on separate dimensions. Development of epistemological beliefs (beliefs about knowledge) have been described in terms of gradual changes in people's belief in: certainty and permanence of knowledge, fixedness of ability, and credibility of authorities such as teachers and experts. People develop more sophisticated beliefs about knowledge as they gain in education and maturity.

Senses of seriousness and of fantasy

A child must learn to develop a sense of seriousness, an ability to distinguish degrees of seriousness as it relates to transgressions and expenditure of time; for example, a child must learn to distinguish between levels of seriousness in admonitions such as between "don't fidget" and "don't forget to look both ways when crossing the street," which have the same linguistic and normative structure, but different levels of seriousness.

www.numerons.in

Individual differences and disabilities



An example of an item from a cognitive abilities test

Each person has an individual profile of characteristics, abilities and challenges that result from predisposition, learning and development. These manifest as individual differences in intelligence, creativity, cognitive style, motivation and the capacity to process information, communicate, and relate to others. The most prevalent disabilities found among school age children are attention deficit hyperactivity disorder (ADHD), learning disability, dyslexia, and speech disorder. Less common disabilities include mental retardation, hearing impairment, cerebral palsy, epilepsy, and blindness.

www.numerons.in

Although theories of intelligence have been discussed by philosophers since Plato, intelligence testing is an invention of educational psychology, and is coincident with the development of that discipline. Continuing debates about the nature of intelligence revolve on whether intelligence can be characterized by a single factor known as general intelligence, multiple factors (e.g., Gardner's theory of multiple intelligences), or whether it can be measured at all. In practice, standardized instruments such as the Stanford-Binet IQ test and the WISC are widely used in economically-developed countries to identify children in need of individualized educational treatment. Children classified as gifted are often provided with accelerated or enriched programs. Children with identified deficits may be provided with enhanced education in specific skills such as phonological awareness. In addition to basic abilities, the individual's personality traits are also important, with people higher in conscientiousness and hope attaining superior academic achievements, even after controlling for intelligence and past performance.

Learning and cognition

www.numerons.in

Two fundamental assumptions that underlie formal education systems are that students (a) retain knowledge and skills they acquire in school, and (b) can apply them in situations outside the classroom. But are these assumptions accurate? Research has found that, even

when students report not using the knowledge acquired in school, a considerable portion is retained for many years and long-term retention is strongly dependent on the initial level of mastery. One study found that university students who took a child development course and attained high grades showed, when tested ten years later, average retention scores of about 30%, whereas those who obtained moderate or lower grades showed average retention scores of about 20%. There is much less consensus on the crucial question of how much knowledge acquired in school transfers to tasks encountered outside formal educational settings, and how such transfer occurs. Some psychologists claim that research evidence for this type of far transfer is scarce, while others claim there is abundant evidence of far transfer in specific domains. Several perspectives have been established within which the theories of learning used in educational psychology are formed and contested. These include behaviorism, cognitivism, social cognitive theory, and constructivism. This section summarizes how educational psychology has researched and applied theories within each of these perspectives.

www.numerons.in

Behavioral perspective

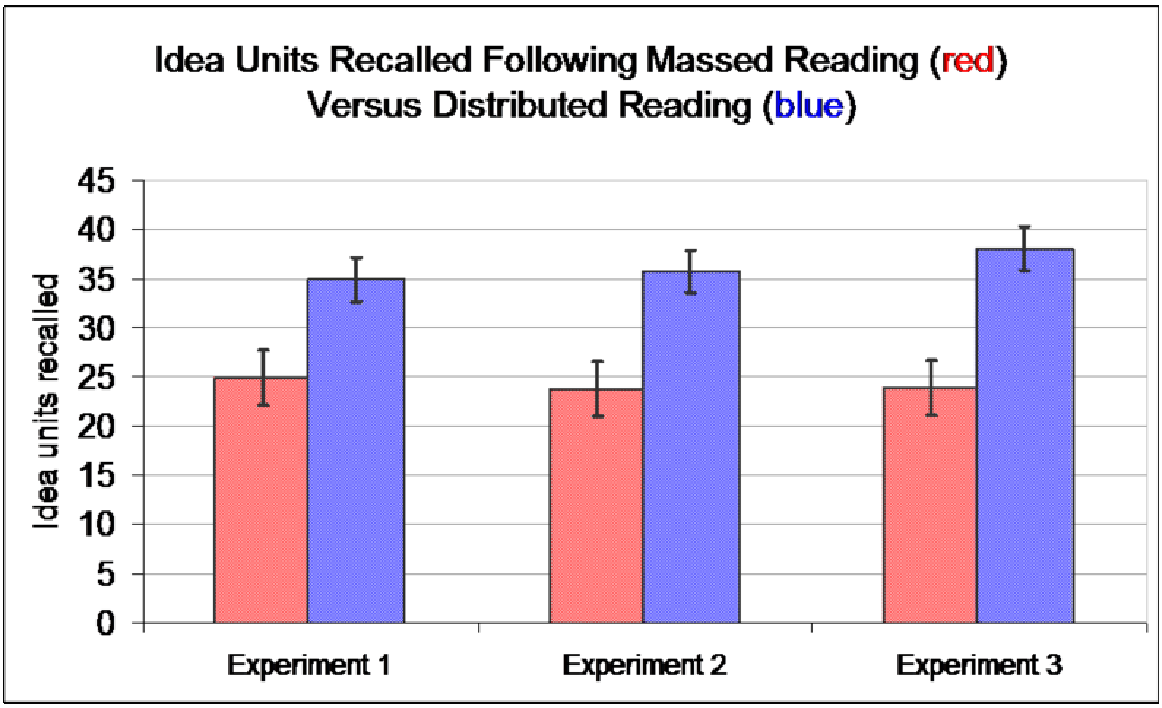
Applied behavior analysis, a set of techniques based on the behavioral principles of operant conditioning, is effective in a range of educational settings. For example, teachers can alter student behavior by systematically rewarding students who follow classroom rules with praise, stars, or tokens exchangeable for sundry items. Despite the demonstrated efficacy of awards in changing behavior, their use in education has been criticized by proponents of self-determination theory, who claim that praise and other rewards undermine intrinsic motivation. There is evidence that tangible rewards decrease intrinsic motivation in specific situations, such as when the student already has a high level of intrinsic motivation to perform the goal behavior. But the results showing detrimental effects are counterbalanced by evidence that, in other situations, such as when rewards are given for attaining a gradually increasing standard of performance, rewards enhance intrinsic motivation. Many effective therapies have been based on the principles of applied behavior analysis, including pivotal response therapy which is used to treat autism spectrum disorders.

www.numerons.in

Cognitive perspective

Among current educational psychologists, the cognitive perspective is more widely held than the behavioral perspective, perhaps because it admits causally-related mental constructs such as traits, beliefs, memories, motivations and emotions. Cognitive theories claim that memory structures determine how information is perceived, processed, stored, retrieved and forgotten. Among the memory structures theorized by cognitive psychologists are separate but linked visual and verbal systems described by Allan Paivio's dual coding theory. Educational psychologists have used dual coding theory and cognitive load theory to explain how people learn from multimedia presentations.

www.numerons.in



Three experiments reported by Krug, Davis and Glover demonstrated the advantage of delaying a 2nd reading of a text passage by one week (distributed) compared with no delay between readings (massed).

The spaced learning effect, a cognitive phenomenon strongly supported by psychological research, has broad applicability within education. For example, students have been found to perform better on a test of knowledge about a text passage when a second reading of the passage is delayed rather than immediate (see figure). Educational psychology research has confirmed the applicability to education of other findings from cognitive psychology, such as the benefits of using mnemonics for immediate and delayed retention of information.

www.numerons.in

Problem solving, regarded by many cognitive psychologists as fundamental to learning, is an important research topic in educational psychology. A student is thought to interpret a problem by assigning it to a schema retrieved from long-term memory. When the problem is assigned to the wrong schema, the student's attention is subsequently directed away from features of the problem that are inconsistent with the assigned schema. The critical step of finding a mapping between the problem and a pre-existing schema is often cited as supporting the centrality of analogical thinking to problem solving.

Developmental perspective

www.numerons.in

Developmental psychology, and especially the psychology of cognitive development, opens a special perspective for educational psychology. This is so because education and the psychology of cognitive development converge on a number of crucial assumptions. First, the psychology of cognitive development defines human cognitive competence at successive phases of development. Education aims to help students acquire knowledge and develop skills which are compatible with their understanding and problem-solving

capabilities at different ages. Thus, knowing the students' level on a developmental sequence provides information on the kind and level of knowledge they can assimilate, which, in turn, can be used as a frame for organizing the subject matter to be taught at different school grades. This is the reason why Piaget's theory of cognitive development was so influential for education, especially mathematics and science education. In the same direction, the neo-Piagetian theories of cognitive development suggest that in addition to the concerns above, sequencing of concepts and skills in teaching must take account of the processing and working memory capacities that characterize successive age levels.

www.numerons.in

Second, the psychology of cognitive development involves understanding how cognitive change takes place and recognizing the factors and processes which enable cognitive competence to develop. Education also capitalizes on cognitive change, because the construction of knowledge presupposes effective teaching methods that would move the student from a lower to a higher level of understanding. Mechanisms such as reflection on actual or mental actions vis-à-vis alternative solutions to problems, tagging new concepts or solutions to symbols that help one recall and mentally manipulate them are just a few examples of how mechanisms of cognitive development may be used to facilitate learning.

Finally, the psychology of cognitive development is concerned with individual differences in the organization of cognitive processes and abilities, in their rate of change, and in their mechanisms of change. The principles underlying intra- and inter-individual differences could be educationally useful, because knowing how students differ in regard to the various dimensions of cognitive development, such as processing and representational capacity, self-understanding and self-regulation, and the various domains of understanding, such as mathematical, scientific, or verbal abilities, would enable the teacher to cater for the needs of the different students so that no one is left behind.

www.numerons.in

Social cognitive perspective

Social cognitive theory is a highly influential fusion of behavioral, cognitive and social elements that was initially developed by educational psychologist Albert Bandura. In its earlier, neo-behavioral incarnation called social learning theory, Bandura emphasized the process of observational learning in which a learner's behavior changes as a result of observing others' behavior and its consequences. The theory identified several factors that determine whether observing a model will affect behavioral or cognitive change. These factors include the learner's developmental status, the perceived prestige and competence of the model, the consequences received by the model, the relevance of the model's behaviors and consequences to the learner's goals, and the learner's self-efficacy. The concept of self-efficacy, which played an important role in later developments of the theory, refers to the learner's belief in his or her ability to perform the modeled behavior.

www.numerons.in

An experiment by Schunk and Hanson, that studied grade 2 students who had previously experienced difficulty in learning subtraction, illustrates the type of research stimulated by social learning theory. One group of students observed a subtraction demonstration by a teacher and then participated in an instructional program on subtraction. A second group observed other grade 2 students performing the same subtraction procedures and then

participated in the same instructional program. The students who observed peer models scored higher on a subtraction post-test and also reported greater confidence in their subtraction ability. The results were interpreted as supporting the hypothesis that perceived similarity of the model to the learner increases self-efficacy, leading to more effective learning of modeled behaviors. It is supposed that peer modeling is particularly effective for students who have low self-efficacy.

Over the last decade, much research activity in educational psychology has focused on developing theories of self-regulated learning (SRL) and metacognition. These theories work from the central premise that effective learners are active agents who construct knowledge by setting goals, analyzing tasks, planning strategies and monitoring their understanding. Research has indicated that learners who are better at goal-setting and self-monitoring tend to have greater intrinsic task interest and self-efficacy; and that teaching learning strategies can increase academic achievement.

www.numerons.in

Constructivist perspective

Constructivism is a category of learning theory in which emphasis is placed on the agency and prior "knowing" and experience of the learner, and often on the social and cultural determinants of the learning process. Educational psychologists distinguish individual (or psychological) constructivism, identified with Piaget's theory of cognitive development, from social constructivism. A dominant influence on the latter type is Lev Vygotsky's work on sociocultural learning, describing how interactions with adults, more capable peers, and cognitive tools are internalized to form mental constructs. Elaborating on Vygotsky's theory, Jerome Bruner and other educational psychologists developed the important concept of instructional scaffolding, in which the social or information environment offers supports for learning that are gradually withdrawn as they become internalized.

www.numerons.in

Motivation

Motivation is an internal state that activates, guides and sustains behavior. Educational psychology research on motivation is concerned with the volition or will that students bring to a task, their level of interest and intrinsic motivation, the personally held goals that guide their behavior, and their belief about the causes of their success or failure. As intrinsic motivation deals with activities that act as their own rewards, extrinsic motivation deals with motivations that are brought on by consequences or punishments.

A form of attribution theory developed by Bernard Weiner describes how students' beliefs about the causes of academic success or failure affect their emotions and motivations. For example, when students attribute failure to lack of ability, and ability is perceived as uncontrollable, they experience the emotions of shame and embarrassment and consequently decrease effort and show poorer performance. In contrast, when students attribute failure to lack of effort, and effort is perceived as controllable, they experience the emotion of guilt and consequently increase effort and show improved performance.

www.numerons.in

Motivational theories also explain how learners' goals affect the way they engage with academic tasks. Those who have mastery goals strive to increase their ability and knowledge. Those who have performance approach goals strive for high grades and seek opportunities to demonstrate their abilities. Those who have performance avoidance goals are driven by fear of failure and avoid situations where their abilities are exposed. Research has found that mastery goals are associated with many positive outcomes such as persistence in the face of failure, preference for challenging tasks, creativity and intrinsic motivation. Performance avoidance goals are associated with negative outcomes such as poor concentration while studying, disorganized studying, less self-regulation, shallow information processing and test anxiety. Performance approach goals are associated with positive outcomes, and some negative outcomes such as an unwillingness to seek help and shallow information processing.

Locus of control is a salient factor in the successful academic performance of students. During the 1970s and '80s, Cassandra B. Whyte did significant educational research studying locus of control as related to the academic achievement of students pursuing higher education coursework. Much of her educational research and publications focused upon the theories of Julian B. Rotter in regard to the importance of internal control and successful academic performance. Whyte reported that individuals who perceive and believe that their hard work may lead to more successful academic outcomes, instead of depending on luck or fate, persist and achieve academically at a higher level. Therefore, it is important to provide education and counseling in this regard.

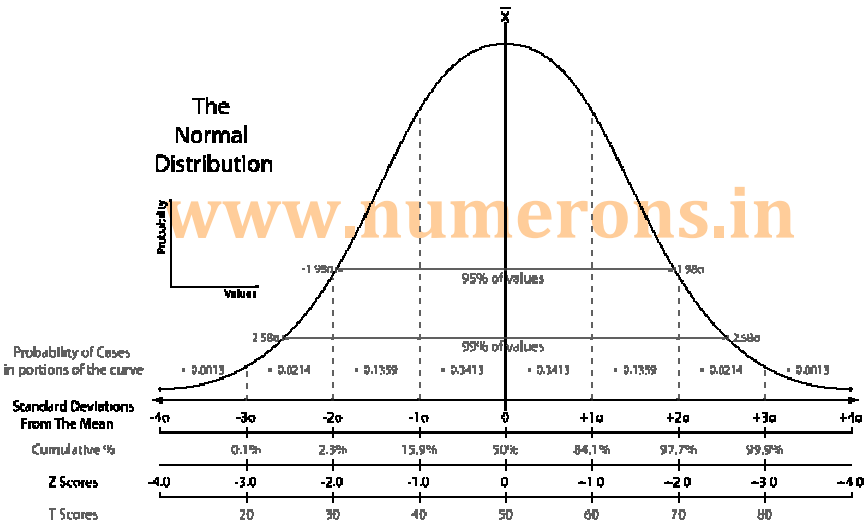
Research methodology

www.numerons.in

The research methods used in educational psychology tend to be drawn from psychology and other social sciences. There is also a history of significant methodological innovation by educational psychologists, and psychologists investigating educational problems. Research methods address problems in both research design and data analysis. Research design informs the planning of experiments and observational studies to ensure that their results have internal, external and ecological validity. Data analysis encompasses methods for processing both quantitive (numerical) and qualitative (non-numerical) research data. Although, historically, the use of quantitative methods was often considered an essential mark of scholarship, modern educational psychology research uses both quantitative and qualitative methods.

Quantitative methods

Perhaps first among the important methodological innovations of educational psychology was the development and application of factor analysis by Charles Spearman. Factor analysis is mentioned here as one example of the many multivariate statistical methods used by educational psychologists. Factor analysis is used to summarize relationships among a large set of variables or test questions, develop theories about mental constructs such as self-efficacy or anxiety, and assess the reliability and validity of test scores. Over 100 years after its introduction by Spearman, factor analysis has become a research staple figuring prominently in educational psychology journals.



Test scores and other educational variables often approximate a normal distribution.

Because educational assessment is fundamental to most quantitative research in the field, educational psychologists have made significant contributions to the field of psychometrics. For example, alpha, the widely used measure of test reliability was developed by educational psychologist Lee Cronbach. The reliability of assessments are routinely reported in quantitative educational research. Although, originally, educational measurement methods were built on classical test theory, item response theory and Rasch models are now used extensively in educational measurement worldwide. These models afford advantages over classical test theory, including the capacity to produce standard errors of measurement for each score or pattern of scores on assessments and the capacity to handle missing responses.

Meta-analysis, the combination of individual research results to produce a quantitative literature review, is another methodological innovation with a close association to educational psychology. In a meta-analysis, effect sizes that represent, for example, the differences between treatment groups in a set of similar experiments, are averaged to obtain a single aggregate value representing the best estimate of the effect of treatment. Several decades after Pearson's work with early versions of meta-analysis, Glass published the first application of modern meta-analytic techniques and triggered their broad application across the social and biomedical sciences. Today, meta-analysis is among the most common types of literature review found in educational psychology research.

Other quantitative research issues associated with educational psychology include the use of nested research designs (e.g., a student nested within a classroom, which is nested within a school, which is nested within a district, etc.) and the use of longitudinal statistical models to measure change.

Qualitative methods

Qualitative methods are used in educational studies whose purpose is to describe events, processes and situations of theoretical significance. The qualitative methods used in educational psychology often derive from anthropology, sociology or sociolinguistics. For example, the anthropological method of ethnography has been used to describe teaching and learning in classrooms. In studies of this type, the researcher may gather detailed field notes as a participant observer or passive observer. Later, the notes and other data may be categorized and interpreted by methods such as grounded theory. Triangulation, the practice of cross-checking findings with multiple data sources, is highly valued in qualitative research.

www.numerons.in

Case studies are forms of qualitative research focusing on a single person, organization, event, or other entity. In one case study, researchers conducted a 150-minute, semi-structured interview with a 20-year-old woman who had a history of suicidal thinking between the ages of 14 to 18. They analyzed an audio-recording of the interview to understand the roles of cognitive development, identity formation and social attachment in ending her suicidal thinking.

Qualitative analysis is most often applied to verbal data from sources such as conversations, interviews, focus groups, and personal journals. Qualitative methods are thus, typically, approaches to gathering, processing and reporting verbal data. One of the most commonly used methods for qualitative research in educational psychology is protocol analysis. In this method the research participant is asked to think aloud while performing a task, such as solving a math problem. In protocol analysis the verbal data is thought to indicate which information the subject is attending to, but is explicitly not interpreted as an explanation or justification for behavior. In contrast, the method of verbal analysis does admit learners' explanations as a way to reveal their mental model or misconceptions (e.g., of the laws of motion). The most fundamental operations in both protocol and verbal analysis are segmenting (isolating) and categorizing sections of verbal data. Conversation analysis and discourse analysis, sociolinguistic methods that focus more specifically on the structure of conversational interchange (e.g., between a teacher and student), have been used to assess the process of conceptual change in science learning. Qualitative methods are also used to analyze information in a variety of media, such as students' drawings and concept maps, video-recorded interactions, and computer log records.

www.numerons.in

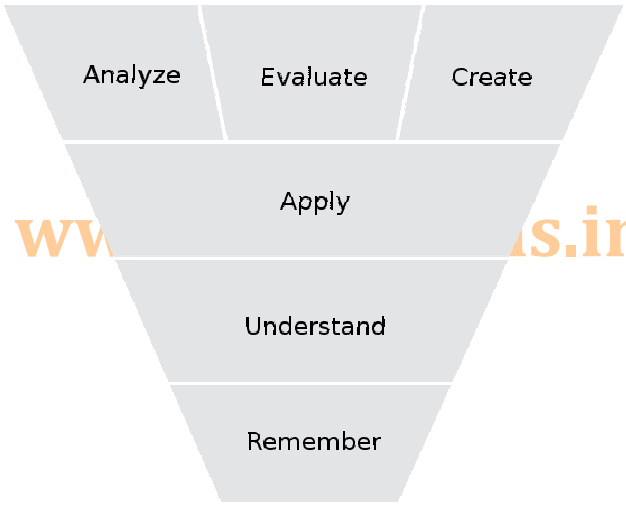
Applications in instructional design and technology

Instructional design, the systematic design of materials, activities and interactive environments for learning, is broadly informed by educational psychology theories and research. For example, in defining learning goals or objectives, instructional designers often use a taxonomy of educational objectives created by Benjamin Bloom and colleagues. Bloom also researched mastery learning, an instructional strategy in which learners only advance to a new learning objective after they have mastered its prerequisite objectives.

Bloom discovered that a combination of mastery learning with one-to-one tutoring is highly effective, producing learning outcomes far exceeding those normally achieved in classroom instruction. Gagné, another psychologist, had earlier developed an influential method of task analysis in which a terminal learning goal is expanded into a hierarchy of learning objectives connected by prerequisite relations.

- Intelligent tutoring system
- Educational technology
- John R. Anderson
- Cognitive tutor
- Cooperative learning
- Collaborative learning
- Problem-based learning
- Computer-supported collaborative learning
- William Winn
- Constructive alignment

www.numerons.in

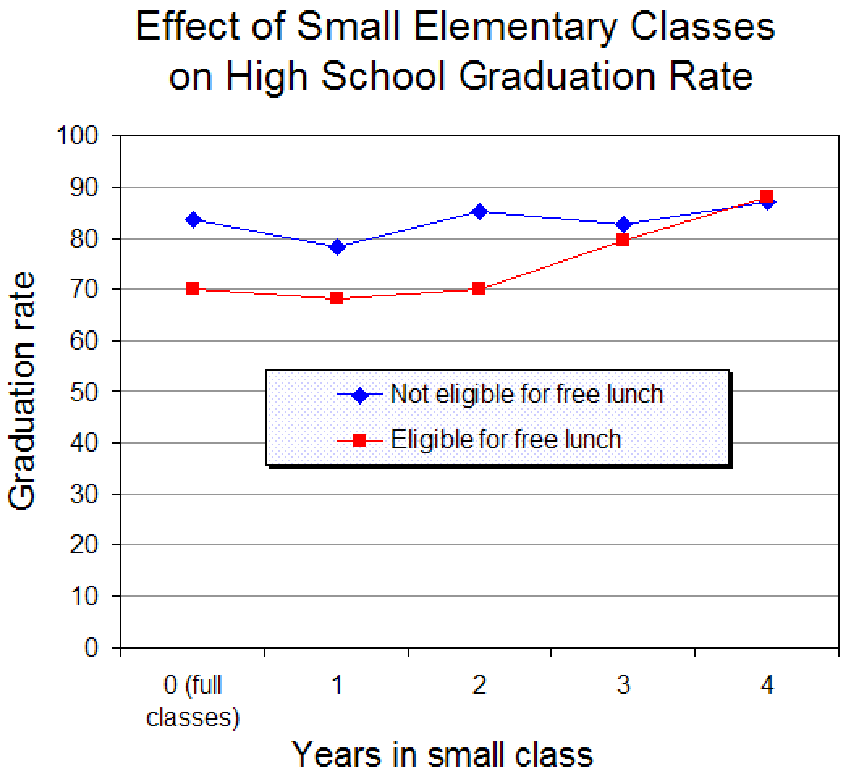


Bloom's taxonomy of educational objectives: categories in the cognitive domain

Applications in teaching

Research on classroom management and pedagogy is conducted to guide teaching practice and form a foundation for teacher education programs. The goals of classroom management are to create an environment conducive to learning and to develop students' self-management skills. More specifically, classroom management strives to create positive teacher–student and peer relationships, manage student groups to sustain on-task behavior, and use counseling and other psychological methods to aid students who present persistent psychosocial problems.

www.numerons.in



A class size experiment in the United States found that attending small classes for 3 or more years in the early grades increased high school graduation of students from low income families

www.numerons.in

Introductory educational psychology is a commonly required area of study in most North American teacher education programs. When taught in that context, its content varies, but it typically emphasizes learning theories (especially cognitively-oriented ones), issues about motivation, assessment of students' learning, and classroom management. A developing Wikibook about educational psychology gives more detail about the educational psychology topics that are typically presented in preservice teacher education.

- Special education
- Lesson plan
- More about applications to classroom teaching

History

Before 1890

www.numerons.in

Modern educational psychologists are not the first to analyze educational processes. Philosophers of education such as Juan Vives, Johann Pestalozzi, Friedrich Froebel, and Johann Herbart had examined, classified and judged the methods of education centuries before the beginnings of psychology in the late 1800s. Juan Vives (1492-1540) proposed induction as the method of study and believed in the direct observation and investigation

of the study of nature. He was one of the first to emphasize that the location of the school is important to learning. He suggested that the school should be located away from disturbing noises; the air quality should be good and there should be plenty of food for the students and teachers. Vives emphasized the importance of understanding individual differences of the students and suggested practice as an important tool for learning. He also supported the education of women.

Johann Pestalozzi (1746-1827) emphasized the child rather than the content of the school. He spoke out against the method of rote memorization as the method for learning and suggested direct observation as a better way of learning. He used object teaching, which means when teaching the teacher should proceed gradually from the concrete objects to the abstract and complex material. He believed that the relationship between the teacher and the child was important in providing a basis for the education of the child. He also was interested in the education of poor children. He was the first to establish an elementary school. Friedrich Froebel (1782-1853) is the founder of the kindergarten movement, which combined work and play to teach children responsibility and cooperation.

Johann Herbart (1776-1841) is considered the father of educational psychology. He believed that learning was influenced by interest in the subject and the teacher. He thought that teachers should consider the students existing mental sets, what they already know, when presenting new information or material. Herbart came up with what is now known as the formal steps. They are 5 steps that teachers should use are:

- Review material that has already been learned by the teacher
- Prepare the student for new material by giving them an overview of what they are learning next
- Present the new material.
- Relate the new material to the old material that has already been learned.
- Show how the student can apply the new material and show the material they will learn next.

1890-1920

The period of 1890-1920 is considered the golden era of educational psychology where aspirations of the new discipline rested on the application of the scientific methods of observation and experimentation to educational problems. From 1840-1920 37 million people immigrated to the United Sates. This created an expansion of elementary schools and secondary schools. The increase in immigration also provided educational psychologists the opportunity to use intelligence testing to screen immigrants at Ellis Island. Darwinism influenced the beliefs of the prominent educational psychologists. Even in the earliest years of the discipline, educational psychologists recognized the limitations of this new approach. The pioneering American psychologist William James commented that:

Psychology is a science, and teaching is an art; and sciences never generate arts directly out of themselves. An intermediate inventive mind must make that application, by using its originality".

James is the father of psychology in America but he also made contributions to educational psychology. In his famous series of lectures Talks to Teachers on Psychology, published in 1899 and now regarded as the first educational psychology textbook, James defines education as "the organization of acquired habits of conduct and tendencies to behavior". He states that teachers should "train the pupil to behavior" so that he fits into the social and physical world. Teachers should also realize the importance of habit and instinct. They should present information that is clear and interesting and relate this new information and material to things the student already knows about. He also addresses important issues such as attention, memory, and association of ideas.

Alfred Binet published Mental Fatigue in 1898, in which he attempted to apply the experimental method to educational psychology. In this experimental method he advocated for two types of experiments, experiments done in the lab and experiments done in the classroom. In 1904 he was appointed the Minister of Public Education. This is when he began to look for a way to distinguish children with developmental disabilities. Binet strongly supported special education programs because he believed that "abnormality" could be cured. The Binet-Simon test was the first intelligence test and was the first to distinguish between "normal children" and those with developmental disabilities. Binet believed that it was important to study individual differences between age groups and children of the same age. He also believed that it was important for teachers to take into account individual students strengths and also the needs of the classroom as a whole when teaching and creating a good learning environment. He also believed that it was important to train teachers in observation so that they would be able to see individual differences among children and adjust the curriculum to the students. Binet also emphasized that practice of material was important. In 1916 Lewis Terman revised the Binet-Simon so that the average score was always 100. The test became known as the Stanford-Binet and was one of the most widely used tests of intelligence. Terman, unlike Binet, was interested in using intelligence test to identify gifted children who had high intelligence. In his longitudinal study of gifted children, who became known as the Termites, Terman found that gifted children become gifted adults.

Edward Thorndike (1874-1949) supported the scientific movement in education. He based teaching practices on empirical evidence and measurement. Thorndike developed the theory of instrumental conditioning or the law of effect. The law of effect states that associations are strengthened when it is followed by something pleasing and associations are weakened when followed by something not pleasing. He also found that learning is done a little at a time or in increments, learning is an automatic process and all the principles of learning apply to all mammals. Thorndike's research with Robert Woodworth on the theory of transfer found that learning one subject will only influence your ability to learn another subject if the subjects are similar. This discovery led to less emphasis on learning the classics because they found that studying the classics do not contribute to overall general intelligence. Thorndike was one of the first to say that individual differences

www.numerons.in

in cognitive tasks was due to how many stimulus response patterns a person had rather than a general intellectual ability. He contributed word dictionaries that were scientifically based to determine the words and definitions used. The dictionaries were the first to take into consideration the users maturity level. He also integrated pictures and easier pronunciation guide into each of the definitions. Thorndike contributed arithmetic books based on learning theory. He made all the problems more realistic and relevant to what was being studied, not just to improve the general intelligence. He developed test that were standardized to measure performance in school related subjects. His biggest contribution to testing was the CAVD intelligence test which used a mulitdimensional approach to intelligence and the first to use a ratio scale. His later work was on programmed instruction, mastery learning and computer-based learning:

www.numerons.in

If, by a miracle of mechanical ingenuity, a book could be so arranged that only to him who had done what was directed on page one would page two become visible, and so on, much that now requires personal instruction could be managed by print.

John Dewey (1859-1952) had a major influence on the development of progressive education in the United States. He believed that the classroom should prepare children to be good citizens and facilitate creative intelligence. He pushed for the creation of practical class that could be applied outside of a school setting. He also thought that education should be student-oriented not subject-oriented. For Dewey education was social that helped bring together generations of people. He states that students learn by doing. He believed in an active mind that was able to be educated through observation and problem solving and inquiry. In his 1910 book How We Think he emphasizes that material should be provided in way that is stimulating and interesting to the student and it encourages original thoughts and problem solving. He also stated that material should be relative to the student's own experience.

www.numerons.in

"The material furnished by way of information should be relevant to a question that is vital in the students own experience"

Jean Piaget (1896-1980) developed the theory of cognitive development. The theory stated that intelligence developed in four different stages. The stages are the sensorimotor stage from birth to 2 years old, the preoperational state from 2 years old to 7 years old, the concrete operational stage from 7 years old to 10 years old, and formal operational stage from 11 years old and up. He also believed that learning was constrained to the child's cognitive development. Piaget influenced educational psychology because he was the first to believe that cognitive development was important and something that should be payed attention to in education. Most of the research on Piagetian theory was mainly tested and done by American educational psychologists

www.numerons.in

1920-Present

The amount of people receiving a high school and college education increased dramatically from 1920-1960. Because of very little jobs available to the teens coming out of eighth grade there was an increase in high school attendance in the 1930's . The progressive

movement in the United State took off at this time and led to the idea of progressive education. John Flanagan, an educational psychologist, developed tests for combat trainees and instructions in combat training. In 1954 the work of Kenneth Clark and his wife on the effects of segregation on black and white children was influential in the Supreme Court case Brown v. Board of Education. From the 1960's to present day educational psychology has switched from a behaviorist perspective to a more cognitive based perspective because of the influence and development of cognitive psychology at this time.

www.numerons.in

Jerome Bruner was the first to apply the cognitive approaches in educational psychology. He was the one who introduced the ideas of Jean Piaget into educational psychology. He advocated for discovery learning where teachers create a problem solving environment that allows the student to question, explore and experiment. In his book The Process of Education Bruner stated that the structure of the material and the cognitive abilities of the person are important in learning. He emphasized the importance of the subject matter. He also believed that how the subject was structured was important for the students understanding of the subject and it is the goal of the teacher to structure the subject in a way that was easy for the student to understand. In the early 1960's Bruner went to Africa to teach math and science to schoolchildren, which influenced his view as schooling as a cultural institution. Bruner was also influential in the development of MACOS, Man a Course of Study, which was an educational program that combined anthropology and science. The program explored human evolution and social behavior. He also helped with the development of the head start program. He was interested in the influence of culture on education and looked at the impact of poverty on educational development.

www.numerons.in

Benjamin Bloom (1913-1999) spent over 50 years at the University of Chicago where he worked in the department of education. He believed that all students can learn. He developed taxonomy of educational objectives. The objectives were divided into three domains: cognitive, affective, and psychomotor. The cognitive domain deals with how we think. It is divided into categories that are on a continuum from easiest to more complex. The categories are knowledge or recall, comprehension application, analysis, synthesis and evaluation. The affective domain deals with emotions and has 5 categories. The categories are receiving phenomenon, responding to that phenomenon, valuing, organization, and internalizing values. The psychomotor domain deals with the development of motor skills, movement and coordination and has 7 categories, that also goes from simplest to complex. The 7 categories of the psychomotor domain are perception, set, guided response, mechanism, complex overt response, adaptation, and origination. The taxonomy provided broad educational objectives that could be used to help expand the curriculum to match the ideas in the taxonomy. The taxonomy is considered to have a greater influence internationally then in the United States. Internationally, the taxonomy is used in every aspect of education from training of the teachers to the development of testing material. Bloom believed in communicating clear learning goals and promoting an active student. He thought that teachers should provide feedback to the students on their strengths and weaknesses. Bloom also did research on college students and their problem solving processes. He found that they differ in understanding the basis of the problem and the ideas in the problem. He also found that students differ in process of problem solving in their approach and attitude toward the problem.

www.numerons.in

Nathaniel Gage is important in educational psychology because he did research to improve teaching and understand the processes involved in teaching. In 1963 he was the editor of the Handbook of Research on Teaching, which became an influential book in educational psychology. The handbook helped set up research on teaching and made research on teaching important to educational psychology. He also was influential in the founding of the Stanford Center for Research and Development in teaching, which not only contributed important research on teaching but also influenced the teaching of important educational psychologists.

www.numerons.in

Educational technology

Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources." The term educational technology is often associated with, and encompasses, instructional theory and learning theory. While instructional technology is "the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning," according to the Association for Educational Communications and Technology (AECT) Definitions and Terminology Committee , educational technology includes other systems used in the process of developing human capability. Educational Technology includes, but is not limited to, software, hardware, as well as Internet applications and activities. But there is still debate on what these terms mean.

www.numerons.in

Technology of education is most simply and comfortably defined as an array of tools that might prove helpful in advancing student learning and may be measured in how and why individuals behave. Educational Technology relies on a broad definition of the word "technology". Technology can refer to material objects of use to humanity, such as machines or hardware, but it can also encompass broader themes, including systems, methods of organization, and techniques. Some modern tools include but are not limited to overhead projectors, laptop computers, and calculators. Newer tools such as "smartphones" and games (both online and offline) are beginning to draw serious attention for their learning potential. Media psychology is the field of study that applies theories in human behavior to educational technology.

Those who employ educational technologies to explore ideas and communicate meaning are learners or teachers.

www.numerons.in

Consider the Handbook of Human Performance Technology. The word technology for the sister fields of Educational and Human Performance Technology means "applied science." In other words, any valid and reliable process or procedure that is derived from basic research using the "scientific method" is considered a "technology." Educational or Human Performance Technology may be based purely on algorithmic or heuristic processes, but neither necessarily implies physical technology. The word technology comes from the Greek "techne" which means craft or art. Another word, "technique," with the same origin,

also may be used when considering the field Educational Technology. So Educational Technology may be extended to include the techniques of the educator.

A classic example of an Educational Psychology text is Bloom's 1956 book, Taxonomy of Educational Objectives. Bloom's Taxonomy is helpful when designing learning activities to keep in mind what is expected of—and what are the learning goals for—learners. However, Bloom's work does not explicitly deal with educational technology per se and is more concerned with pedagogical strategies.

www.numerons.in

According to some, an Educational Technologist is someone who transforms basic educational and psychological research into an evidence-based applied science (or a technology) of learning or instruction. Educational Technologists typically have a graduate degree (Master's, Doctorate, Ph.D., or D.Phil.) in a field related to educational psychology, educational media, experimental psychology, cognitive psychology or, more purely, in the fields of Educational, Instructional or Human Performance Technology or Instructional (Systems) Design. But few of those listed below as theorists would ever use the term "educational technologist" as a term to describe themselves, preferring terms such as "educator". The transformation of educational technology from a cottage industry to a profession is discussed by Shurville, Browne, and Whitaker.

A Short History

Educational technology in a way could be traced back to the emergence of very early tools, e.g., paintings on cave walls. But usually its history starts with educational film (1900s) or Sidney Pressey's mechanical teaching machines in the 1920s.

www.numerons.in

The first large scale usage of new technologies can be traced to US WWII training of soldiers through training films and other mediated materials. Today, presentation-based technology, based on the idea that people can learn through aural and visual reception, exists in many forms, e.g., streaming audio and video, or PowerPoint presentations with voice-over. Another interesting invention of the 1940s was hypertext, i.e., V. Bush's memex.

The 1950s led to two major, still popular designs. Skinners work led to "programmed instruction" focusing on the formulation of behavioral objectives, breaking instructional content into small units and rewarding correct responses early and often. Advocating a mastery approach to learning based on his taxonomy of intellectual behaviors, Bloom endorsed instructional techniques that varied both instruction and time according to learner requirements. Models based on these designs were usually referred to as computer-based training" (CBT), Computer-aided instruction or computer-assisted instruction (CAI) in the 1970s through the 1990s. In a more simplified form they correspond to today's "e-contents" that often form the core of "e-learning" set-ups, sometimes also referred to as web-based training (WBT) or e-instruction. The course designer divides learning contents into smaller chunks of text augmented with graphics and multimedia presentation. Frequent Multiple Choice questions with immediate feedback are added for self-assessment and guidance. Such e-contents can rely on standards defined by IMS, ADL/Scorm and IEEE.

www.numerons.in

The 1980s and 1990s produced a variety of schools that can be put under the umbrella of the label Computer-based learning (CBL). Frequently based on constructivist and cognitivist learning theories, these environments focused on teaching both abstract and domain-specific problem solving. Preferred technologies were micro-worlds (computer environments where learners could explore and build), simulations (computer environments where learner can play with parameters of dynamic systems) and hypertext.

www.numerons.in

Digitized communication and networking in education started in the mid 80s and became popular by the mid-90's, in particular through the World-Wide Web (WWW), eMail and Forums. There is a difference between two major forms of online learning. The earlier type, based on either Computer Based Training (CBT) or Computer-based learning (CBL), focused on the interaction between the student and computer drills plus tutorials on one hand or micro-worlds and simulations on the other. Both can be delivered today over the WWW. Today, the prevailing paradigm in the regular school system is Computer-mediated communication (CMC), where the primary form of interaction is between students and instructors, mediated by the computer. CBT/CBL usually means individualized (self-study) learning, while CMC involves teacher/tutor facilitation and requires scenarization of flexible learning activities. In addition, modern ICT provides education with tools for sustaining learning communities and associated knowledge management tasks. It also provides tools for student and curriculum management.

In addition to classroom enhancement, learning technologies also play a major role in full-time distance teaching. While most quality offers still rely on paper, videos and occasional CBT/CBL materials, there is increased use of e-tutoring through forums, instant messaging, video-conferencing etc. Courses addressed to smaller groups frequently use blended or hybrid designs that mix presence courses (usually in the beginning and at the end of a module) with distance activities and use various pedagogical styles (e.g., drill & practise, exercises, projects, etc.).

www.numerons.in

The 2000s emergence of multiple mobile and ubiquitous technologies gave a new impulse to situated learning theories favoring learning-in-context scenarios. Some literature uses the concept of integrated learning to describe blended learning scenarios that integrate both school and authentic (e.g., workplace) settings.

Theories and practices

Three main theoretical schools or philosophical frameworks have been present in the educational technology literature. These are Behaviorism, Cognitivism and Constructivism. Each of these schools of thought are still present in today's literature but have evolved as the Psychology literature has evolved.

www.numerons.in

Behaviorism

This theoretical framework was developed in the early 20th century with the animal learning experiments of Ivan Pavlov, Edward Thorndike, Edward C. Tolman, Clark L. Hull,

B.F. Skinner and many others. Many psychologists used these theories to describe and experiment with human learning. While still very useful this philosophy of learning has lost favor with many educators.

Skinner's Contributions

B.F. Skinner wrote extensively on improvements of teaching based on his functional analysis of Verbal Behavior and wrote "The Technology of Teaching", an attempt to dispel the myths underlying contemporary education as well as promote his system he called programmed instruction. Ogden Lindsley also developed the Celeration learning system similarly based on behavior analysis but quite different from Keller's and Skinner's models.

www.numerons.in

Cognitivism

Cognitive science has changed how educators view learning. Since the very early beginning of the Cognitive Revolution of the 1960s and 1970s, learning theory has undergone a great deal of change. Much of the empirical framework of Behaviorism was retained even though a new paradigm had begun. Cognitive theories look beyond behavior to explain brain-based learning. Cognitivists consider how human memory works to promote learning.

After memory theories like the Atkinson-Shiffrin memory model and Baddeley's Working memory model were established as a theoretical framework in Cognitive Psychology, new cognitive frameworks of learning began to emerge during the 1970s, 1980s, and 1990s. It is important to note that Computer Science and Information Technology have had a major influence on Cognitive Science theory. The Cognitive concepts of working memory (formerly known as short term memory) and long term memory have been facilitated by research and technology from the field of Computer Science. Another major influence on the field of Cognitive Science is Noam Chomsky. Today researchers are concentrating on topics like Cognitive load and Information Processing Theory. In addition, psychology as applied to media is easily measured in studying behavior. The area of media psychology is both cognative and affective and is central to understanding educational technology.

www.numerons.in

Constructivism

Constructivism is a learning theory or educational philosophy that many educators began to consider in the 1990s. One of the primary tenets of this philosophy is that learners construct their own meaning from new information, as they interact with reality or others with different perspectives.

Constructivist learning environments require students to utilize their prior knowledge and experiences to formulate new, related, and/or adaptive concepts in learning. Under this framework the role of the teacher becomes that of a facilitator, providing guidance so that learners can construct their own knowledge. Constructivist educators must make sure that the prior learning experiences are appropriate and related to the concepts being taught. Jonassen (1997) suggests "well-structured" learning environments are useful for novice learners and that "ill-structured" environments are only useful for more advanced learners.

www.numerons.in

Educators utilizing technology when teaching with a constructivist perspective should choose technologies that reinforce prior learning perhaps in a problem-solving environment.

Instructional technique and technologies

Problem Based Learning and Inquiry-based learning are active learning educational technologies used to facilitate learning. Technology which includes physical and process applied science can be incorporated into project, problem, inquiry-based learning as they all have a similar educational philosophy. All three are student centered, ideally involving real-world scenarios in which students are actively engaged in critical thinking activities. The process that students are encouraged to employ (as long as it is based on empirical research) is considered to be a technology. Classic examples of technologies used by teachers and Educational Technologists include Bloom's Taxonomy and Instructional Design.

www.numerons.in

Theorists

This is an area where new thinkers are coming to the forefront everyday. Many of the ideas spread from theorists, researchers, and experts through their blogs. Extensive lists of educational bloggers by area of interest are available at Steve Hargadon's "SupportBloggers" site or at the "movingforward" wiki started by Scott McLeod. Many of these blogs are recognized by their peers each year through the edublogger awards. Web 2.0 technologies have led to a huge increase in the amount of information available on this topic and the number of educators formally and informally discussing it. Most listed below have been around for more than a decade, however, and few new thinkers mentioned above are listed here.

www.numerons.in

- Alan November
- Seymour Papert
- Will Richardson
- John Sweller
- Don Krug
- Alex Jones
- George Siemens
- David Wiley
- David Wilson
- Bernard Luskin

Benefits

www.numerons.in

Educational technology is intended to improve education over what it would be without technology. Some of the claimed benefits are listed below:

- Easy-to-access course materials. Instructors can post the course material or important information on a course website, which means students can study at a time and location they prefer and can obtain the study material very quickly
- Student motivation. Computer-based instruction can give instant feedback to students and explain correct answers. Moreover, a computer is patient and non-judgmental, which can give the student motivation to continue learning. According to James Kulik, who studies the effectiveness of computers used for instruction, students usually learn more in less time when receiving computer-based instruction and they like classes more and develop more positive attitudes toward computers in computer-based classes. The American educator, Cassandra B. Whyte, researched and reported about the importance of locus of control and successful academic performance and by the late 1980s, she wrote of how important computer usage and information technology would become in the higher education experience of the future.
- Wide participation. Learning material can be used for long distance learning and are accessible to a wider audience
- Improved student writing. It is convenient for students to edit their written work on word processors, which can, in turn, improve the quality of their writing. According to some studies, the students are better at critiquing and editing written work that is exchanged over a computer network with students they know
- Subjects made easier to learn. Many different types of educational software are designed and developed to help children or teenagers to learn specific subjects. Examples include pre-school software, computer simulators, and graphics software
- A structure that is more amenable to measurement and improvement of outcomes. With proper structuring it can become easier to monitor and maintain student work while also quickly gauging modifications to the instruction necessary to enhance student learning.
- Differentiated Instruction. Educational technology provides the means to focus on active student participation and to present differentiated questioning strategies. It broadens individualized instruction and promotes the development of personalized learning plans. Students are encouraged to use multimedia components and to incorporate the knowledge they gained in creative ways.

Criticism

Although technology in the classroom does have many benefits, there are clear drawbacks as well. Lack of proper training, limited access to sufficient quantities of a technology, and the extra time required for many implementations of technology are just a few of the reasons that technology is often not used extensively in the classroom. To understand educational technology one must also understand theories in human behavior as behavior is affected by technology. Media Psychology is the study of media, technology and how and why individuals, groups and societies behave the way they do. The first Ph.D program with a concentration in media psychology was started in 2002 at Fielding Graduate University by Bernard Luskin. The Media Psychology division of APA, division 46 has a focus on media psychology. Media and the family is another emerging area affected by rapidly changing educational technology.

www.numerons.in

Similar to learning a new task or trade, special training is vital to ensuring the effective integration of classroom technology. Since technology is not the end goal of education, but rather a means by which it can be accomplished, educators must have a good grasp of the technology being used and its advantages over more traditional methods. If there is a lack in either of these areas, technology will be seen as a hindrance and not a benefit to the goals of teaching.

www.numerons.in

Another difficulty is introduced when access to a sufficient quantity of a resource is limited. This is often seen when the quantity of computers or digital cameras for classroom use is not enough to meet the needs of an entire classroom. It also occurs in less noticed forms such as limited access for technology exploration because of the high cost of technology and the fear of damages. In other cases, the inconvenience of resource placement is a hindrance, such as having to transport a classroom to a computer lab instead of having in-classroom computer access by means of technology such as laptop carts.

Technology implementation can also be time consuming. There may be an initial setup or training time cost inherent in the use of certain technologies. Even with these tasks accomplished, technology failure may occur during the activity and as a result teachers must have an alternative lesson ready. Another major issue arises because of the evolving nature of technology. New resources have to be designed and distributed whenever the technological platform has been changed. Finding quality materials to support classroom objectives after such changes is often difficult even after they exist in sufficient quantity and teachers must design these resources on their own.

www.numerons.in

Experimental evidence suggests that these criticisms may have limited basis. See, for example, the work done by Sugata Mitra. A recent presentation summarizes the research and Dr. Mitra's current research initiative.

Educational technology and the humanities

Research from the Alberta Initiative for School Improvement (AISI) indicates that inquiry and project-based approaches, combined with a focus on curriculum, effectively supports the infusion of educational technologies into the learning and teaching process.

Technology in the classroom

There are various types of technologies currently used in traditional classrooms. Among these are:

www.numerons.in

- Computer in the classroom: Having a computer in the classroom is an asset to any teacher. With a computer in the classroom, teachers are able to demonstrate a new lesson, present new material, illustrate how to use new programs, and show new websites.

- Class website: An easy way to display your student's work is to create a web page designed for your class. Once a web page is designed, teachers can post homework assignments, student work, famous quotes, trivia games, and so much more. In today's society, children know how to use the computer and navigate their way through a website, so why not give them one where they can be a published author. Just be careful as most districts maintain strong policies to manage official websites for a school or classroom. Also, most school districts provide teacher webpages that can easily be viewed through the school district's website.

www.numerons.in

- Class blogs and wikis: There are a variety of Web 2.0 tools that are currently being implemented in the classroom. Blogs allow for students to maintain a running dialogue, such as a journal,thoughts, ideas, and assignments that also provide for student comment and reflection. Wikis are more group focused to allow multiple members of the group to edit a single document and create a truly collaborative and carefully edited finished product.

- Wireless classroom microphones: Noisy classrooms are a daily occurrence, and with the help of microphones, students are able to hear their teachers more clearly. Children learn better when they hear the teacher clearly. The benefit for teachers is that they no longer lose their voices at the end of the day.

- Mobile devices: Mobile devices such as clickers or smartphone can be used to enhance the experience in the classroom by providing the possibility for professors to get feedback. See also MLearning.

www.numerons.in

- Interactive Whiteboards: An interactive whiteboard that provides touch control of computer applications. These enhance the experience in the classroom by showing anything that can be on a computer screen. This not only aids in visual learning, but it is interactive so the students can draw, write, or manipulate images on the interactive whiteboard.

- Online media: Streamed video websites can be utilized to enhance a classroom lesson (e.g. United Streaming, Teacher Tube, etc.)

- Digital Games: The field of educational games and serious games has been growing significantly over the last few years. The digital games are being provided as tools for the classroom and have a lot of positive feedback including higher motivation for students.

There are many other tools being utilized depending on the local school board and funds available. These may include: digital cameras, video cameras, interactive whiteboard tools, document cameras, or LCD projectors.

www.numerons.in

- Podcasts: Podcasting is a relatively new invention that allows anybody to publish files to the Internet where individuals can subscribe and receive new files from people by a subscription. The primary benefit of podcasting for educators is quite

simple. It enables teachers to reach students through a medium that is both "cool" and a part of their daily lives. For a technology that only requires a computer, microphone and internet connection, podcasting has the capacity of advancing a student's education beyond the classroom. When students listen to the podcasts of other students as well as their own, they can quickly demonstrate their capacities to identify and define "quality." This can be a great tool for learning and developing literacy inside and outside the classroom. Podcasting can help sharpen students' vocabulary, writing, editing, public speaking, and presentation skills. Students will also learn skills that will be valuable in the working world, such as communication, time management, and problem-solving.

www.numerons.in

Cognitive tutor

A cognitive tutor is an intelligent tutoring system which develops a cognitive model of a student as he or she interacts with the program, providing problems and individualized instruction based on this model.

Cognitive Tutor is also the name of a product produced by Carnegie Learning. In each lesson, it tends to tell of a real world scenario. Then, it asks the student to solve a section math problems related to the scenario. The next section makes the student think of how they solved the problem and teaches them the concepts used to solve. Another scenario and questions with similar concepts are given. An example might be lesson of scientific notation for Algebra I. Students are told about how Sci. Notation is used to describe distance between planets and asked to simplify distances between planets. Then they are told how to simply move the decimal rather than simplify through multiplication, and are asked to apply this skill. The next section will be dedicated to Sci. Notation for unusually small numbers, like diameter of a cell. At the end they are asked to apply both concepts on a variety of different problems and explain in complete sentences what happens to numbers when multiplied by powers of 10 with negative or positive exponents.

www.numerons.in

Intelligent tutoring system

An intelligent tutoring system (ITS) is any computer system that provides direct customized instruction or feedback to students, i.e. without the intervention of human beings, whilst performing a task. Thus, ITS implements the theory of learning by doing. An ITS may employ a range of different technologies. However, usually such systems are more narrowly conceived of as artificial intelligence systems, more specifically expert systems made to simulate aspects of a human tutor. Intelligent Tutor Systems have been around since the late 1970s, but increased in popularity in the 1990s.

www.numerons.in

The structure of an ITS system

Intelligent tutoring systems consist of four different subsystems or modules: the interface module, the expert module, the student module, and the tutor module. The interface module provides the means for the student to interact with the ITS, usually through a

graphical user interface and sometimes through a rich simulation of the task domain the student is learning (e.g., controlling a power plant or performing a medical operation). The expert module references an expert or domain model containing a description of the knowledge or behaviors that represent expertise in the subject-matter domain the ITS is teaching—often an expert system or cognitive model. An example would be the kind of diagnostic and subsequent corrective actions an expert technician takes when confronted with a malfunctioning thermostat. The student module uses a student model containing descriptions of student knowledge or behaviors, including his misconceptions and knowledge gaps. An apprentice technician might, for instance, believe a thermostat also signals too high temperatures to a furnace (misconception) or might not know about thermostats that also gauge the outdoor temperature (knowledge gap). A mismatch between a student's behavior or knowledge and the expert's presumed behavior or knowledge is signaled to the tutor module, which subsequently takes corrective action, such as providing feedback or remedial instruction. To be able to do this, it needs information about what a human tutor in such situations would do: the tutor model.

www.numerons.in

An intelligent tutoring system is only as effective as the various models it relies on to adequately model expert, student and tutor knowledge and behavior. Thus, building an ITS needs careful preparation in terms of describing the knowledge and possible behaviors of experts, students and tutors. This description needs to be done in a formal language in order that the ITS may process the information and draw inferences in order to generate feedback or instruction. Therefore a mere description is not enough; the knowledge contained in the models should be organized and linked to an inference engine. It is through the latter's interaction with the descriptive data that tutorial feedback is generated.

www.numerons.in

Use in practice

All this is a substantial amount of work, even if authoring tools have become available to ease the task. This means that building an ITS is an option only in situations in which they, in spite of their relatively high development costs, still reduce the overall costs through reducing the need for human instructors or sufficiently boosting overall productivity. Such situations occur when large groups need to be tutored simultaneously or many replicated tutoring efforts are needed. Cases in point are technical training situations such as training of military recruits and high school mathematics. One specific type of intelligent tutoring system, Cognitive Tutors, has been incorporated into mathematics curricula in a substantial number of United States high schools, producing improved student learning outcomes on final exams and standardized tests. Intelligent tutoring systems have been constructed to help students learn geography, circuits, medical diagnosis, computer programming, mathematics, physics, genetics, chemistry, etc. Intelligent Language Tutoring Systems (ILTS), e.g. this one, teach natural language to first or second language learners. ILTS requires specialized natural language processing tools such large dictionaries, and morphological and grammatical analyzers with acceptable coverage.

www.numerons.in

ITS conference

The Intelligent Tutoring Systems conference was typically held every other year in Montréal (Canada) by Claude Frasson and Gilles Gauthier in 1988, 1992, 1996 and 2000; in San Antonio (US) by Carol Redfield and Valerie Shute in 1998; in Biarritz (France) and San Sebastian (Spain) by Guy Gouardères and Stefano Cerri in 2002; in Maceio (Brazil) by Rosa Maria Vicari and Fábio Paraguaçu in 2004; in Jhongli (Taiwan) by Tak-Wai Chan in 2006. The conference was recently back in Montreal in 2008 (for its 20th anniversary) by Roger Nkambou and Susanne Lajoie. ITS'2010 was held in Pittsburgh (US) by Jack Mostow, Judy Kay, and Vincent Aleven. The International Artificial Intelligence in Education (AIED) Society (http://iaied.org) publishes The International Journal of Artificial Intelligence in Education (IJAIED) and produces the International Conference on Artificial Intelligence in Education every odd numbered year. The American Association of Artificial Intelligence (AAAI)(www.aaai.org) sometimes has symposia and papers related to intelligent tutoring systems. A number of books have been written on ITS including three published by Lawrence Erlbaum Associates.

www.numerons.in

William Winn

William David "Bill" Winn (died 2006) was an educational psychologist who made notable contributions to the understanding of how people learn from diagrams, and on how cognitive and constructivist theories of learning can help instructional designers select effective teaching strategies.

www.numerons.in

His areas of teaching and research included instructional theory, design of computer-based learning, instructional effects of illustrations, theories of visual perception applied to instructional materials design, computer interfaces, and the roles and effectiveness of virtual environments in education and training. This work extended cognitive theories of learning into systems dynamics models of cognition and cognitive neuroscience.

Winn was a professor at the University of Washington College of Education where he held appointments in curriculum and instruction, and cognitive studies. He was also director of the Learning Center at the Human Interface Technology Lab (HITLab), and adjunct professor in the College of Engineering, and the Music department.

Career path

Specializing first in French and German languages and comparative literature, Winn earned a BA and MA from Oxford University and an MA from Indiana University. He earned a PhD from Indiana University (1972) in Instructional Systems Technology (minor educational psychology) for research on instructional message design. His doctoral dissertation was on the Similarity of Hierarchically Organized Pairs of Pictures and Words as Reported by Field-Dependent and Field-Independent High-School Seniors.

www.numerons.in

From 1972 to 1974, Winn was an assistant professor in the Department of Pedagogy, Faculty of Education, at the University of Sherbrooke. From 1974 to 1985, he was the academic coordinator of the Learning Technology Unit at the University of Calgary.

Winn was the editor of Educational Communication and Technology Journal, and served on the editorial review boards of many other journals in the fields of educational psychology and educational technology.

www.numerons.in

Winn collaborated broadly across disciplines and national boundaries, presenting papers in French, German and English. In addition to teaching, extensive graduate advising activities, and a prolific writing schedule, at the time of his death he was working on research with the Puget Sound Marine Environment Modeling Group, Augmented reality and physical models of complex organic molecules, INFACT/PixelMath, and collaborating with PRISM and the Center for Environmental Visualization.

Research in Educational Technology

Computer-based Learning

Winn was very interested in computer-based learning for being a method that allows students to obtain information in formats that cannot be presented by teachers and because it gives the students control of the information. He acknowledged that computer-based learning follows a constructivist learning approach because students construct understandings for themselves by interacting with the material they encounter.

www.numerons.in

Virtual environments

Winn also focused his research in constructing virtual learning environments which are computer created environments intended to simulate realistic experiences in order to help students understand concepts presented in those environments. For example, Winn explained “that the act of designing and creating environments that embody concepts and principles governing phenomena as diverse as wetlands ecology and medieval castles helps students master these topics with depth and clarity” . He also found that virtual learning has greater success for students who do poorly in school. However, teaching through virtual environments also has its weaknesses. Winn declared that this method of learning often result in misconceptions due to oversimplifying the interactions that occur in the natural environments which are simulated . Additionally, problems in the transfer of knowledge are seen in younger students who lack the ability to think abstractly. These children have a difficulty transferring what they learn in the virtual world to other areas in the real world .

www.numerons.in

Learning Oceanography from a Computer Compared to Direct Experience at Sea

This is an example of one of the studies conducted by Winn in which he evaluated the difference of learning in a computer based environment as oppose to learning through direct experience. In this study, two groups of college students learned oceanography. One

group learned using a computer simulation of the ocean which included a 3D model, and the other group learned by spending a day in a research vessel and used oceanographic tools . In his discussion of this study Winn makes reference to Kolb's experiential learning theory because it highlights the significance of direct experience with the environment, as well as the need for abstract concepts in order to learn and apply knowledge. According to Winn, the proper use of metaphors in simulations may allow students to learn abstract concepts better than they would in real experiences . This study took place in Seattle and was focused on the oceanography of the Puget Sound estuary system within Washington. There were 25 students in each group and both groups received a total of three lessons. Two of the lessons were taught by the same professors and covered the same material. For the third lesson the groups were separated to their different settings . One of the limitations of this study was that the students taking the "Virtual Puget Sound" (VPS) experience could only control some independent variables but not others, like for example they could not change the salinity of the water. The results of the study showed "no difference in overall learning between students who used the VPS simulation and those who studied the same material in the field". However, the study found that students with less experience in water learned more from direct experience, while the simulated ocean experience helped students transfer the knowledge they obtained while working in the computer, to the material presented in class.

www.numerons.in

Response to criticism

After reading Winn's article titled Current trends in educational technology research: The study of learning environments published in 2002, the educational psychologist Richard Mayer (2003) criticized Winn's article for dismissing controlled experiments and in this way dismissing an approach that would produce substantial evidence and enable researchers to make claims on the learning development of students. In response to Mayer's criticism Winn confirmed that experimental research is important, and he proposed that researchers use a system that connects evidence from both experimental and non-experimental research when conducting their studies since each method produces different information. Controlled experimental research is useful for obtaining details about student learning, and non-experimental research allows the researcher to see how learning occurs in real settings.

www.numerons.in

A Non-experimental Research Method

As part of his response to Mayer's criticism, Winn articulates that a good non-experimental method for researchers to use is the "design experiment" which was described by Ann Brown in 1992. Winn prefers this type of experiment particularly because it conveys many features of open ended research methods . In a design experiment, the researcher tests his or her intervention in an educational setting such as a classroom, makes modifications depending on the data collected, and conducts the intervention until it produces good results. The data collected is in form of observations, results from tests, or any form of work that will show that the student has learned what is expected. Compared to a controlled experiment in which many variables are controlled, in the design experiment, modifications are made over time. Winn explained that a key difference between the two

www.numerons.in

types of experiments is that "the controlled experiment adapts the setting to suit the intervention through experimental control, whereas the design experiment adapts the intervention to suit the setting through iteration" . Although Winn is in favor of design experiments he does note one of its weaknesses. This type of non-experimental research involves more time and skill than implementing experimental research. However, it can yield crucial evidence about the success of interventions and how students learn.

Implications for Educational Technology

www.numerons.in

Winn made significant contributions to the field of educational technology as evident by his extensive research in this area. The following is a list of eight suggestions provided by Winn (2002) for those researchers who are also working in this field, or for future researchers . This list provides useful information on how practitioners can reduce factors that may disrupt research findings and thus assist in improving educational technology research.

- Instructors should not use metaphors that may confuse students or prevent them from understanding concepts.
- Computer learning environments yield greater results when conducted under a constructivist approach. Instructors should allow for mistakes and should not use virtual environments to teach basic facts.
- Educational technology is not a sufficient method for teaching. Educators should implement activities and other methods of communication into their lessons.
- Students must understand the task they have to accomplish and they require scaffolding to obtain their end goal.
- Educators must implement social context in the technology driven learning environment, and acknowledge sharing and collaboration amongst students.
- Educators should involve experts from the outside community in order to make their teaching effective.
- Educators should promote that the students make changes to their learning environment, as this will allow educators to obtain information about student learning.
- Educators, students, and researchers should work as a team since they all contribute to the improvement of educational technology research.

www.numerons.in

Instructional theory

Instructional theory is a discipline that focuses on how to structure material for promoting the education of human beings, particularly youth. Originating in the United States in the late 1970s, instructional theory is typically divided into two categories: the cognitive and behaviorist schools of thought. Instructional theory was spawned off the 1956 work of Benjamin Bloom, a University of Chicago professor, and the results of his Taxonomy of Education Objectives — one of the first modern codifications of the learning process. One of the first instructional theorists was Robert M. Gagne, who in 1965 published Conditions of Learning for the Florida State University's Department of Educational Research.

www.numerons.in

Renowned psychologist B. F. Skinner's theories of behavior were highly influential on instructional theorists because their hypotheses can be tested fairly easily with the scientific process. It is more difficult to demonstrate cognitive learning results. Paulo Freire's Pedagogy of the Oppressed had a broad influence over a generation of American educators with his critique of various "banking" models of education and analysis of the teacher-student relationship.

On the first page of Chapter 2 of Pedagogy of the Oppressed Freire explains: "Narration (with the teacher as narrator) leads the students to memorize mechanically the narrated content. Worse yet, it turns them into “containers,” into “receptacles” to be “filled” by the teacher. The more completely she fills the receptacles, the better a teacher she is. The more meekly the receptacles permit themselves to be filled, the better students they are."

www.numerons.in

In this way he expains that in this since the educator creates an act of depositing knowledge in a student. The student thus becomes a repository of knowledge. Freire explains that this system that lacks creativity and knowledge suffers. Knowledge according to Freire comes about only through the learner by inquiry and pursuing the subjects in the world and through interpersonal interaction.

Freire further states, "In the banking concept of education, knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing. Projecting an absolute ignorance onto others, a characteristic of the ideology of oppression, negates education and knowledge as processes of inquiry. The teacher presents himself to his students as their necessary opposite; by considering their ignorance absolute, he justifies his own existence. The students, alienated like the slave in the Hegelian dialectic, accept their ignorance as justifying the teacher’s existence — but, unlike the slave, they never discover that they educate the teacher. The raison d'etre of libertarian education, on the other hand, lies in its drive towards reconciliation. Education must begin with the solution of the teacher-student contradiction, by reconciling the poles of the contradiction so that both are simultaneously teachers and students. "

www.numerons.in

In the context of e-learning, a major discussion in instructional theory is the potential of learning objects to structure and deliver content. A stand-alone educational animation is an example of a learning object that can be re-used as the basis for different learning experiences. There are currently many groups trying to set standards for the development and implementation of learning objects. At the forefront of the standards groups is the Department of Defense's Advanced Distributed Learning initiative with its SCORM standards. SCORM stands for Shareable Content Object Reference Model.

Instructional design

www.numerons.in

Instructional Design (also called Instructional Systems Design (ISD)) is the practice of maximizing the effectiveness, efficiency and appeal of instruction and other learning experiences. The process consists broadly of determining the current state and needs of the learner, defining the end goal of instruction, and creating some "intervention" to assist in

the transition. Ideally the process is informed by pedagogically (process of teaching) and andragogically (adult learning) tested theories of learning and may take place in student-only, teacher-led or community-based settings. The outcome of this instruction may be directly observable and scientifically measured or completely hidden and assumed. There are many instructional design models but many are based on the ADDIE model with the five phases: 1) analysis, 2) design, 3) development, 4) implementation, and 5) evaluation. As a field, instructional design is historically and traditionally rooted in cognitive and behavioral psychology.

www.numerons.in

History

Much of the foundations of the field of instructional design was laid in World War II, when the U.S. military faced the need to rapidly train large numbers of people to perform complex technical tasks, from field-stripping a carbine to navigating across the ocean to building a bomber—see "Training Within Industry (TWI)". Drawing on the research and theories of B.F. Skinner on operant conditioning, training programs focused on observable behaviors. Tasks were broken down into subtasks, and each subtask treated as a separate learning goal. Training was designed to reward correct performance and remediate incorrect performance. Mastery was assumed to be possible for every learner, given enough repetition and feedback. After the war, the success of the wartime training model was replicated in business and industrial training, and to a lesser extent in the primary and secondary classroom. The approach is still common in the U.S. military.

In 1956, a committee led by Benjamin Bloom published an influential taxonomy of what he termed the three domains of learning: Cognitive (what one knows or thinks), Psychomotor (what one does, physically) and Affective (what one feels, or what attitudes one has). These taxonomies still influence the design of instruction.

www.numerons.in

During the latter half of the 20th century, learning theories began to be influenced by the growth of digital computers.

In the 1970s, many instructional design theorists began to adopt an information-processing-based approach to the design of instruction. David Merrill for instance developed Component Display Theory (CDT), which concentrates on the means of presenting instructional materials (presentation techniques).

Later in the 1980s and throughout the 1990s cognitive load theory began to find empirical support for a variety of presentation techniques.

Cognitive load theory and the design of instruction

www.numerons.in

Cognitive load theory developed out of several empirical studies of learners, as they interacted with instructional materials. Sweller and his associates began to measure the effects of working memory load, and found that the format of instructional materials has a direct effect on the performance of the learners using those materials.

While the media debates of the 1990s focused on the influences of media on learning, cognitive load effects were being documented in several journals. Rather than attempting to substantiate the use of media, these cognitive load learning effects provided an empirical basis for the use of instructional strategies. Mayer asked the instructional design community to reassess the media debate, to refocus their attention on what was most important: learning.

By the mid- to late-1990s, Sweller and his associates had discovered several learning effects related to cognitive load and the design of instruction (e.g. the split attention effect, redundancy effect, and the worked-example effect). Later, other researchers like Richard Mayer began to attribute learning effects to cognitive load. Mayer and his associates soon developed a Cognitive Theory of Multimedia Learning.

www.numerons.in

In the past decade, cognitive load theory has begun to be internationally accepted and begun to revolutionize how practitioners of instructional design view instruction. Recently, human performance experts have even taken notice of cognitive load theory, and have begun to promote this theory base as the science of instruction, with instructional designers as the practitioners of this field. Finally Clark, Nguyen and Sweller published a textbook describing how Instructional Designers can promote efficient learning using evidence-based guidelines of cognitive load theory.

Instructional Designers use various instructional strategies to reduce cognitive load. For example, they think that the onscreen text should not be more than 150 words or the text should be presented in small meaningful chunks. The designers also use auditory and visual methods to communicate information to the learner.

www.numerons.in

Learning design

The concept of learning design arrived in the literature of technology for education in the late nineties and early 2000s with the idea that "designers and instructors need to choose for themselves the best mixture of behaviourist and constructivist learning experiences for their online courses" . But the concept of learning design is probably as old as the concept of teaching. Learning design might be defined as "the description of the teaching-learning process that takes place in a unit of learning (eg, a course, a lesson or any other designed learning event)".

As summarized by Britain, learning design may be associated with:

- The concept of learning design
- The implementation of the concept made by learning design specifications like PALO, IMS Learning Design, LDL, SLD 2.0, etc...
- The technical realisations around the implementation of the concept like TELOS, RELOAD LD-Author, etc...

www.numerons.in

Instructional design models

ADDIE process

Perhaps the most common model used for creating instructional materials is the ADDIE Process. This acronym stands for the 5 phases contained in the model:

Analyze – analyze learner characteristics, task to be learned, etc.

Identify Instructional Goals, Conduct Instructional Analysis, Analyze Learners and Contexts

www.numerons.in

Design – develop learning objectives, choose an instructional approach

Write Performance Objectives, Develop Assessment Instruments, Develop Instructional Strategy

Develop – create instructional or training materials

Design and selection of materials appropriate for learning activity, Design and Conduct Formative Evaluation

Implement – deliver or distribute the instructional materials
Evaluate – make sure the materials achieved the desired goals

Design and Conduct Summative Evaluation

www.numerons.in

Most of the current instructional design models are variations of the ADDIE process.

Rapid prototyping

Sometimes utilized adaptation to the ADDIE model is in a practice known as rapid prototyping.

Proponents suggest that through an iterative process the verification of the design documents saves time and money by catching problems while they are still easy to fix. This approach is not novel to the design of instruction, but appears in many design-related domains including software design, architecture, transportation planning, product development, message design, user experience design, etc. In fact, some proponents of design prototyping assert that a sophisticated understanding of a problem is incomplete without creating and evaluating some type of prototype, regardless of the analysis rigor that may have been applied up front. In other words, up-front analysis is rarely sufficient to allow one to confidently select an instructional model. For this reason many traditional methods of instructional design are beginning to be seen as incomplete, naive, and even counter-productive.

www.numerons.in

However, some consider rapid prototyping to be a somewhat simplistic type of model. As this argument goes, at the heart of Instructional Design is the analysis phase. After you thoroughly conduct the analysis—you can then choose a model based on your findings.

That is the area where most people get snagged—they simply do not do a thorough-enough analysis. (Part of Article By Chris Bressi on LinkedIn)

Dick and Carey

Another well-known instructional design model is The Dick and Carey Systems Approach Model. The model was originally published in 1978 by Walter Dick and Lou Carey in their book entitled The Systematic Design of Instruction.

www.numerons.in

Dick and Carey made a significant contribution to the instructional design field by championing a systems view of instruction as opposed to viewing instruction as a sum of isolated parts. The model addresses instruction as an entire system, focusing on the interrelationship between context, content, learning and instruction. According to Dick and Carey, "Components such as the instructor, learners, materials, instructional activities, delivery system, and learning and performance environments interact with each other and work together to bring about the desired student learning outcomes". The components of the Systems Approach Model, also known as the Dick and Carey Model, are as follows:

- Identify Instructional Goal(s): goal statement describes a skill, knowledge or attitude(SKA) that a learner will be expected to acquire
- Conduct Instructional Analysis: Identify what a learner must recall and identify what learner must be able to do to perform particular task
- Analyze Learners and Contexts: General characteristic of the target audience, Characteristic directly related to the skill to be taught, Analysis of Performance Setting, Analysis of Learning Setting
- Write Performance Objectives: Objectives consists of a description of the behavior, the condition and criteria. The component of an objective that describes the criteria that will be used to judge the learner's performance.
- Develop Assessment Instruments: Purpose of entry behavior testing, purpose of pretesting, purpose of posttesting, purpose of practive items/practive problems
- Develop Instructional Strategy: Pre-instructional activities, content presentation, Learner participation, assessment
- Develop and Select Instructional Materials
- Design and Conduct Formative Evaluation of Instruction: Designer try to identify areas of the instructional materials that are in need to improvement.
- Revise Instruction: To identify poor test items and to identify poor instruction
- Design and Conduct Summative Evaluation

With this model, components are executed iteratively and in parallel rather than linearly.

Instructional Development Learning System (IDLS)

www.numerons.in

Another instructional design model is the Instructional Development Learning System (IDLS). The model was originally published in 1970 by Peter J. Esseff, PhD and Mary Sullivan Esseff, PhD in their book entitled IDLS—Pro Trainer 1: How to Design, Develop, and Validate Instructional Materials.

Peter (1968) & Mary (1972) Esseff both received their doctorates in Educational Technology from the Catholic University of America under the mentorship of Dr. Gabriel Ofiesh, a Founding Father of the Military Model mentioned above. Esseff and Esseff contributed synthesized existing theories to develop their approach to systematic design, "Instructional Development Learning System" (IDLS).

The components of the IDLS Model are:

www.numerons.in

- Design a Task Analysis
- Develop Criterion Tests and Performance Measures
- Develop Interactive Instructional Materials
- Validate the Interactive Instructional Materials

Other models

Some other useful models of instructional design include: the Smith/Ragan Model, the Morrison/Ross/Kemp Model and the OAR model, as well as, Wiggins theory of backward design.

Learning theories also play an important role in the design of instructional materials. Theories such as behaviorism, constructivism, social learning and cognitivism help shape and define the outcome of instructional materials.

www.numerons.in

Instructional technology

In education, instructional technology is "the theory and practice of design, development, utilization, management, and evaluation of processes and resources for learning," according to the Association for Educational Communications and Technology (AECT) Definitions and Terminology Committee. Instructional technology is often referred to as a part of educational technology but the use of these terms has changed over the years. Educational technology is the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources." Labels do matter! While instructional technology covers the processes and systems of learning and instruction, educational technology includes other systems used in the process of developing human capability.

History

www.numerons.in

The first use of instructional technology cannot be attributed to a specific person or time. Many histories of instructional technology start in the early 20th century, while others go back to the 17th century. This depends on the definition of instructional technology. Definitions that focus on a systems approach tend to reach further back in history, while those definitions focused on sensory devices are more recent.

The use of audio and visual instruction was boosted as a military response to the problems of a labor shortage during World War II in the United States. There was a definitive need to fill the factories with skilled labor. Instructional technology provided a methodology for training in a systematic and efficient manner.

With it came the use of highly structured manuals, instructional films, and standardized tests. Thomas Edison saw the value of instructional technology in films but did not formalize the science of instruction as the US military did so well.

www.numerons.in

Current status

Instructional technology is a growing field of study which uses technology as a means to solve educational challenges, both in the classroom and in distance learning environments.

While instructional technology promises solutions to many educational problems, resistance from faculty and administrators to the use of technology in the classroom is not unusual. This reaction can arise from the belief--or fear--that the ultimate aim of instructional technology is to reduce or even remove the human element of instruction. However, most instructional technologists would counter that education will always require human intervention from instructors or facilitators.

Many graduate programs are producing instructional designers, who increasingly are being employed by industry and universities to create materials for distance education programs. These professionals often employ e-learning tools, which provide distance learners the opportunity to interact with instructors and experts in the field, even if they are not located physically close to each other.

www.numerons.in

More recently a new form of Instructional technology known as Human Performance Technology has evolved. HPT focuses on performance problems and deals primarily with corporate entities.

Relation to learning theory

The purpose of instructional technology, of course, is the promotion of learning. Learning theory (education) has influenced Instructional design and Instructional designers (the practitioners of Instructional Technology). Instructional Technologies promote communication and interactivity. These two come together under the general heading of Interaction.

Moore (1989) argues that there are three types of learner interaction (learner-content, learner-instructor, and learner-learner interactions). In the years since Moore's article, several philosophical views have surfaced that relate Instructional technology to these types of interaction.

www.numerons.in

Most traditional researchers (those subscribing to Cognitivism) argue that learner-content interaction is perhaps the most important endeavor of Instructional technology. Some

researchers (those subscribing to constructivism) argue that Moore's social interactions, (learner-instructor and learner-learner interactions), are as useful as learner-content interaction.

Areas

Razavi (2005) advocates the idea that educational technology covers instructional technology. It includes instructional technology and the field study in human teaching and learning. So educational technology is broader than instructional technology. Instructional technology itself consists of two major parts: one is teaching technology and the other is learning technology. In the education industry, the term "instructional technology" is frequently used interchangeably with "educational technology."

Human Performance Technology (HPT) has a focus on corporate environments. Learning sciences is a growing area of focus dealing instructional techniques and learning theories.

Teaching method

Teaching methods can best be defined as the types of principles and methods used for instruction. There are many types of teaching methods, depending on what information or skill the teacher is trying to convey. Class participation, demonstration, recitation, and memorization are some of the teaching methods being used. When a teacher is deciding on their method, they need to be flexible and willing to adjust their style according to their students. Student success in the classroom is largely based on effective teaching methods.

www.numerons.in

Diversity in Teaching in the Classroom

For effective teaching to take place, a good method must be adopted by a teacher. A teacher has many options when choosing a style by which to teach. The teacher may write lesson plans of their own, borrow plans from other teachers, or search online or within books for lesson plans. When deciding what teaching method to use, a teacher needs to consider students' background knowledge, environment, and learning goals. Teachers are aware that students learn in different ways, but almost all children will respond well to praise. Students have different ways of absorbing information and of demonstrating their knowledge. Teachers often use techniques which cater to multiple learning styles to help students retain information and strengthen understanding. A variety of strategies and methods are used to ensure that all students have equal opportunities to learn. A lesson plan may be carried out in several ways: Questioning, explaining, modeling, collaborating, and demonstrating.

www.numerons.in

A teaching method that includes questioning is similar to testing. A teacher may ask a series of questions to collect information of what students have learned and what needs to be taught. Testing is another application of questioning. A teacher tests the student on what was previously taught in order to identify if a student has learned the material. Standardized testing is in about every middle school (i.e. Ohio Graduation Test (OGT), Proficiency Test, College entrance Tests (ACT and SAT).

Learning can be done in three ways- Auditory, Visual, and Kinaesthetic. It is important to try and include all three as much as possible into your lessons.

Explaining

This form is similar to lecturing. Lecturing is teaching by giving a discourse on a specific subject that is open to the public, usually given in the classroom. This can also be associated with modeling. Modeling is used as a visual aid to learning. Students can visualize an object or problem, then use reasoning and hypothesizing to determine an answer.

In your lecture you have the opportunity to tackle two types of learning. Not only can explaining (lecture) help the auditory learner through the speech of the teacher, but if the teacher is to include visuals in the form of overheads or slide shows, his/her lecture can have duality. Although a student might only profit substantially from one form of teaching, all students profit some from the different types of learning.

Demonstrating

Demonstrations are done to provide an opportunity to learn new exploration and visual learning tasks from a different perspective. A teacher may use experimentation to demonstrate ideas in a science class. A demonstration may be used in the circumstance of proving conclusively a fact, as by reasoning or showing evidence.

The uses of storytelling and examples have long since become standard practice in the realm of textual explanation. But while a more narrative style of information presentation is clearly a preferred practice in writing, judging by its prolificacy, this practice sometimes becomes one of the more ignored aspects of lecture. Lectures, especially in a collegiate environment, often become a setting more geared towards factorial presentation than a setting for narrative and/or connective learning. The use of examples and storytelling likely allows for better understanding but also greater individual ability to relate to the information presented. Learning a list of facts provides a detached and impersonal experience while the same list, containing examples and stories, becomes, potentially, personally relatable. Furthermore, storytelling in information presentation may also reinforce memory retention because it provides connections between factorial presentation and real-world examples/personable experience, thus, putting things into a clearer perspective and allowing for increased neural representation in the brain. Therefore, it is important to provide personable, supplementary, examples in all forms of information presentation because this practice likely allows for greater interest in the subject matter and better information-retention rates.

Often in lecture numbers or stats are used to explain a subject but often when many numbers are being used it is difficult to see the whole picture. Visuals that are bright in color, etc. offer a way for the students to put into perspective the numbers or stats that are being used. If the student can not only hear but see what is being taught, it is more likely

www.numerons.in

they will believe and fully grasp what is being taught. It allows another way for the student to relate to the material.

Collaborating

Having students work in groups is another way a teacher can direct a lesson. Collaborating allows students to talk with each other and listen to all points of view in the discussion. It helps students think in a less personally biased way. When this lesson plan is carried out, the teacher may be trying to assess the lesson by looking at the student's: ability to work as a team, leadership skills, or presentation abilities. It is one of the direct instructional methods.

A different kind of group work is the discussion. After some preparation and with clearly defined roles as well as interesting topics, discussions may well take up most of the lesson, with the teacher only giving short feedback at the end or even in the following lesson. Discussions can take a variety of forms, e.g. fishbowl discussions.

Collaborating (kinaesthetic) is great in that it allows to actively participate in the learning process. These students who learn best this way by being able to relate to the lesson in that they are physically taking part of it in some way. Group projects and discussions are a great way to welcome this type of learning.

Learning by teaching

Learning by teaching (German:LdL) is a widespread method in Germany, developed by Jean-Pol Martin. The students take the teacher's role and teach their peers.

This method is very effective when done correctly. Having students teach sections of the class as a group or as individuals is a great way to get the students to really study out the topic and understand it so as to teach it to their peers. By having them participate in the teaching process it also builds self-confidence, self-efficacy, and strengthens students speaking and communication skills. Students will not only learn their given topic, but they will gain experience that could be very valuable for life.

Evolution of teaching methods

Ancient education

About 3000 BC, with the advent of writing, education became more conscious or self-reflecting, with specialized occupations requiring particular skills and knowledge on how to be a scribe, an astronomer, etc.

Philosophy in ancient Greece led to questions of educational method entering national discourse. In his Republic, Plato describes a system of instruction that he felt would lead to an ideal state. In his Dialogues, Plato describes the Socratic method.

www.numerons.in

It has been the intent of many educators since then, such as the Roman educator Quintilian, to find specific, interesting ways to encourage students to use their intelligence and to help them to learn.

Medieval education

Comenius, in Bohemia, wanted all boys and girls to learn. In his The World in Pictures, he gave the first vivid, illustrated textbook which contained much that children would be familiar with in everyday life, and use it to teach the academic subjects they needed to know. Rabelais described how the student Gargantua learned about the world, and what is in it.

Much later, Jean-Jacques Rousseau in his Emile, presented methodology to teach children the elements of science and much more. In it, he famously eschewed books, saying the world is one's book. And so Emile was brought out into the woods without breakfast to learn the cardinal directions and the positions of the sun as he found his way home for something to eat.

There was also Johann Heinrich Pestalozzi of Switzerland, whose methodology during Napoleonic warfare enabled refugee children, of a class believed to be unteachable, to learn - and love to learn. He describes this in his account of the educational experiment at Stanz. He felt the key to have children learn is for them to be loved, but his method, though transmitted later in the school for educators he founded, has been thought "too unclear to be taught today". One result was, when he would ask, "Children, do you want to learn more or go to sleep?" they would reply, "Learn more!"

www.numerons.in

19th century - compulsory education

The Prussian education system was a system of mandatory education dating to the early 19th century. Parts of the Prussian education system have served as models for the education systems in a number of other countries, including Japan and the United States. The Prussian model had a side effect of requiring additional classroom management skills to be incorporated into the teaching process.

20th century

In the 20th century, the philosopher, Eli Siegel, who believed that all children are equally capable of learning regardless of ethnic background or social class, stated: "The purpose of all education is to like the world through knowing it." This is a goal which is implicit in previous educators, but in this principle, it is made conscious. With this principle at basis, teachers, predominantly in New York, have found that students learn the curriculum with the kind of eagerness that Pestalozzi describes for his students at Stanz centuries earlier.

www.numerons.in

Many current teaching philosophies are aimed at fulfilling the precepts of a curriculum based on Specially Designed Academic Instruction in English (SDAIE). Arguably the qualities of a SDAIE curriculum are as effective if not more so for all 'regular' classrooms.

Some critical ideas in today's education environment include:

- Instructional scaffolding
- Graphic organizers
- Standardized testing

According to Dr. Shaikh Imran, the teaching methodology in education is a new concept in the teaching learning process. New methods involved in the teaching learning process are television, radio, computer, etc.

Other educators believe that the use of technology, while facilitating learning to some degree, is not a substitute for educational method that brings out critical thinking and a desire to learn. Another modern teaching method is inquiry learning and the related inquiry-based science.

Elvis H. Bostwick recently concluded Dr. Cherry's quantitative study "The Interdisciplinary Effect of Hands On Science", a three-year study of 3920 middle school students and their Tennessee State Achievement scores in Math, Science, Reading and Social Studies. Metropolitan Nashville Public School is considered urban demographically and can be compared to many of urban schools nationally and internationally. This study divided students on the basis of whether they had hands-on trained teachers over the three-year period addressed by the study.

Students who had a hands-on trained science teacher for one or more years had statistically higher standardized test scores in science, math and social studies. For each additional year of being taught by a hands-on trained teacher, the student's grades increased.dsasd

Constructive alignment

Constructive alignment is a principle used for devising teaching and learning activities, and assessment tasks, that directly address the learning outcomes intended in a way not typically achieved in traditional lectures, tutorial classes and examinations (Biggs and Tang, 2007). Constructive alignment was devised by Professor John B. Biggs, and represents a marriage between a constructivist understanding of the nature of learning, and an aligned design for outcomes-based teaching education.

Constructive alignment is the underpinning concept behind the current requirements for programme specification, declarations of Intended Learning Outcomes (ILOs) and assessment criteria, and the use of criterion based assessment. There are two basic concepts behind constructive alignment:

- Learners construct meaning from what they do to learn. This concept derives from cognitive psychology and constructivist theory, and recognizes the importance of

linking new material to concepts and experiences in the learner's memory, and extrapolation to possible future scenarios via the abstraction of basic principles through reflection.

- The teacher makes a deliberate alignment between the planned learning activities and the learning outcomes. This is a conscious effort to provide the learner with a clearly specified goal, a well designed learning activity or activities that are appropriate for the task, and well designed assessment criteria for giving feedback to the learner.

www.numerons.in

A branch of educational evaluation theory has emerged that focuses on constructive alignment as a key element in effective educational design. Known as Design Focused Evaluation (Smith 2008) this approach seeks student feedback on the efficacy of the designed alignment between the intended learning outcomes and the teaching and learning activities students engage in during a course of study.

Bloom's Taxonomy

The Bloom's Wheel, according to the Bloom's verbs and matching assessment types. The verbs are intended to be feasible and measurable.

Bloom's Taxonomy is a classification of learning objectives within education proposed in 1956 by a committee of educators chaired by Benjamin Bloom who also edited the first volume of the standard text, Taxonomy of educational objectives: the classification of educational goals. Although named for Bloom, the publication followed a series of conferences from 1949 to 1953, which were designed to improve communication between educators on the design of curricula and examinations.

www.numerons.in

It refers to a classification of the different objectives that educators set for students (learning objectives). Bloom's Taxonomy divides educational objectives into three "domains": Cognitive, Affective, and Psychomotor (sometimes loosely described as knowing/head, feeling/heart and doing/hands respectively). Within the domains, learning at the higher levels is dependent on having attained prerequisite knowledge and skills at lower levels . A goal of Bloom's Taxonomy is to motivate educators to focus on all three domains, creating a more holistic form of education.

A revised version of the taxonomy was created in 2000.

Bloom's Taxonomy is considered to be a foundational and essential element within the education community as evidenced in the 1981 survey Significant writings that have influenced the curriculum: 1906-1981, by H.G. Shane and the 1994 yearbook of the National Society for the Study of Education.

www.numerons.in

A mythology has grown around the taxonomy, possibly due to many people learning about the taxonomy through second hand information. Bloom himself considered the Handbook, "one of the most widely cited yet least read books in American education".

Domains

Key to understanding the taxonomy and its revisions, variations, and addenda over the years is an understanding that the original Handbook in 1956 was intended only to focus on one of the three domains (as indicated in the domain specification in title: The Taxonomy of Educational Objectives: Handbook I: Cognitive Domain), but there was expectation that additional material would be generated for the other domains (as indicated in the numbering of the handbook in the title).

www.numerons.in

The second volume, Handbook II: Affective Domain edited by David Krathwohl was published in 1964.

There was no Handbook III for the Psychometric domain published by the committee as the consensus was that (as college level academics) they lacked the necessary experience to do the job properly. Substitute domain taxonomies have been published by various authors to fill the gap.

Bloom also considered the initial effort to be a starting point, as evidenced in a memorandum from 1971 in which he said, "Ideally each major field should have its own taxonomy in its own language - more detailed, closer to the special language and thinking of its experts, reflecting its own appropriate sub-divisions and levels of education, with possible new categories, combinations of categories and omitting categories as appropriate."

www.numerons.in

Cognitive

Categories in the cognitive domain of Bloom's Taxonomy (Anderson & Krathwohl, 2001)

Skills in the cognitive domain revolve around knowledge, comprehension, and critical thinking of a particular topic. Traditional education tends to emphasize the skills in this domain, particularly the lower-order objectives.

There are six levels in the taxonomy, moving through the lowest order processes to the highest:

Knowledge

Exhibit memory of previously-learned materials by recalling facts, terms, basic concepts and answers

www.numerons.in

- Knowledge of specifics - terminology, specific facts
- Knowledge of ways and means of dealing with specifics - conventions, trends and sequences, classifications and categories, criteria, methodology
- Knowledge of the universals and abstractions in a field - principles and generalizations, theories and structures

Questions like: What are the health benefits of eating apples?

Comprehension

Demonstrative understanding of facts and ideas by organizing, comparing, translating, interpreting, giving descriptions, and stating main ideas

www.numerons.in

- Translation
- Interpretation
- Extrapolation

Questions like: Compare the health benefits of eating apples vs. oranges.

Application

Using new knowledge. Solve problems to new situations by applying acquired knowledge, facts, techniques and rules in a different way

Questions like: Which kinds of apples are best for baking a pie, and why?

Analysis

Examine and break information into parts by identifying motives or causes. Make inferences and find evidence to support generalizations

www.numerons.in

- Analysis of elements
- Analysis of relationships
- Analysis of organizational principles

Questions like: List four ways of serving foods made with apples and explain which ones have the highest health benefits. Provide references to support your statements.

Synthesis

Compile information together in a different way by combining elements in a new pattern or proposing alternative solutions

- Production of a unique communication
- Production of a plan, or proposed set of operations
- Derivation of a set of abstract relations

www.numerons.in

Questions like: Convert an "unhealthy" recipe for apple pie to a "healthy" recipe by replacing your choice of ingredients. Explain the health benefits of using the ingredients you chose vs. the original ones.

Evaluation

Present and defend opinions by making judgments about information, validity of ideas or quality of work based on a set of criteria

- Judgments in terms of internal evidence
- Judgments in terms of external criteria

www.numerons.in

Questions like: Do you feel that serving apple pie for an after school snack for children is healthy? Why or why not?

Affective

Skills in the affective domain describe the way people react emotionally and their ability to feel another living thing's pain or joy. Affective objectives typically target the awareness and growth in attitudes, emotion, and feelings.

There are five levels in the affective domain moving through the lowest order processes to the highest:

Receiving

The lowest level; the student passively pays attention. Without this level no learning can occur.

www.numerons.in

Responding

The student actively participates in the learning process, not only attends to a stimulus; the student also reacts in some way.

Valuing

The student attaches a value to an object, phenomenon, or piece of information.

Organizing

The student can put together different values, information, and ideas and accommodate them within his/her own schema; comparing, relating and elaborating on what has been learned.

Characterizing

The student holds a particular value or belief that now exerts influence on his/her behaviour so that it becomes a characteristic.

Psychomotor

www.numerons.in

Skills in the psychomotor domain describe the ability to physically manipulate a tool or instrument like a hand or a hammer. Psychomotor objectives usually focus on change and/or development in behavior and/or skills.

Bloom and his colleagues never created subcategories for skills in the psychomotor domain, but since then other educators have created their own psychomotor taxonomies. Simpson (1972) among other contributors, such as Harrow (1972) and Dave (1967), created a Psychomotor Taxonomy that helps to explain the behavior of typical learners or high performance athletes. The proposed levels are:

1. Perception: The ability to use sensory cues to guide motor activity. This ranges from sensory stimulation, through cue selection, to translation. Examples: Detects non-verbal communication cues. Estimate where a ball will land after it is thrown and then moving to the correct location to catch the ball. Adjusts heat of stove to correct temperature by smell and taste of food. Adjusts the height of the forks on a forklift by comparing where the forks are in relation to the pallet. Key Words: chooses, describes, detects, differentiates, distinguishes, identifies, isolates, relates, selects.

www.numerons.in

2. Set: Readiness to act. It includes mental, physical, and emotional sets. These three sets are dispositions that predetermine a person's response to different situations (sometimes called mindsets). Examples: Knows and acts upon a sequence of steps in a manufacturing process. Recognize one's abilities and limitations. Shows desire to learn a new process (motivation). NOTE: This subdivision of Psychomotor is closely related with the "Responding to phenomena" subdivision of the Affective domain. Key Words: begins, displays, explains, moves, proceeds, reacts, shows, states, volunteers.

3. Guided Response: The early stages in learning a complex skill that includes imitation and trial and error. Adequacy of performance is achieved by practicing. Examples: Performs a mathematical equation as demonstrated. Follows instructions to build a model. Responds hand-signals of instructor while learning to operate a forklift. Key Words: copies, traces, follows, react, reproduce, responds

www.numerons.in

4. Mechanism: This is the intermediate stage in learning a complex skill. Learned responses have become habitual and the movements can be performed with some confidence and proficiency. Examples: Use a personal computer. Repair a leaking faucet. Drive a car. Key Words: assembles, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches.

5. Complex Overt Response: The skillful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, accurate, and highly coordinated performance, requiring a minimum of energy. This category includes performing without hesitation, and automatic performance. For example, players are often utter sounds of satisfaction or expletives as soon as they hit a tennis ball or throw a football, because they can tell by the feel of the act what the result will produce. Examples: Maneuvers a car into a tight parallel parking spot. Operates a computer quickly and accurately. Displays competence while playing the piano. Key Words: assembles, builds, calibrates, constructs, dismantles, displays, fastens, fixes, grinds, heats, manipulates, measures, mends, mixes, organizes, sketches. NOTE: The Key Words are the same as Mechanism, but will have adverbs or adjectives that indicate that the performance is quicker, better, more accurate, etc.

www.numerons.in

6. Adaptation: Skills are well developed and the individual can modify movement patterns to fit special requirements. Examples: Responds effectively to unexpected experiences. Modifies instruction to meet the needs of the learners. Perform a task with a machine that it was not originally intended to do (machine is not damaged and there is no danger in performing the new task). Key Words: adapts, alters, changes, rearranges, reorganizes, revises, varies.

www.numerons.in

7. Origination: Creating new movement patterns to fit a particular situation or specific problem. Learning outcomes emphasize creativity based upon highly developed skills. Examples: Constructs a new theory. Develops a new and comprehensive training programming. Creates a new gymnastic routine. Key Words: arranges, builds, combines, composes, constructs, creates, designs, initiate, makes, originates.

Definition of Knowledge

In to appendix to Handbook I, there is a definition of knowledge which serves as the apex for an alternative, summary classification of the educational goals. This is significant as the Taxonomy has been called upon significantly in other fields such as knowledge management, potentially out of context

"Knowledge, as defined here, involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure, or setting. (Bloom et al. 1956 p 201)"

www.numerons.in

The taxonomy is set out:

- Knowledge
- Knowledge of Specifics
- Knowledge of Terminology
- Knowledge of Specific Facts
- Knowledge of Ways and Means of Dealing with Specifics
- Knowledge of Conventions
- Knowledge of Trends and Sequences
- Knowledge of Classifications and Categories
- Knowledge of Criteria
- Knowledge of Methodology
- Knowledge of The Universals and Abstractions in a Field
- Knowledge of Principles and Generalizations
- Knowledge of Theories and Structures (Bloom et al. 1956 p 201-204)

www.numerons.in

Criticism of the Taxonomy

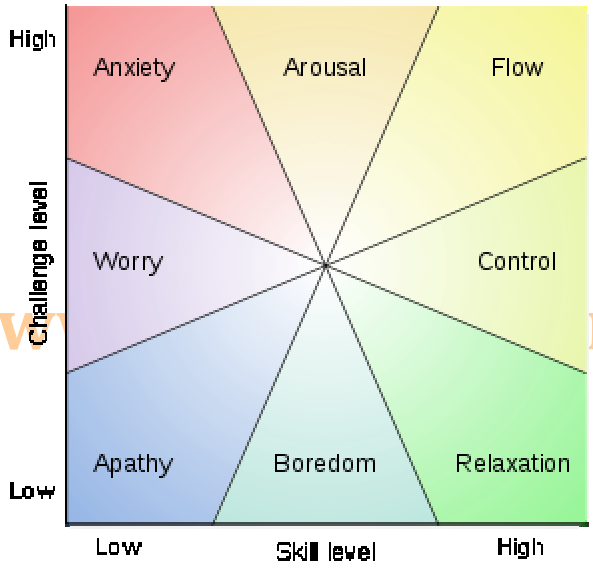
As Morshead pointed out on the publication of the second volume, the classification wasn't a properly constructed taxonomy, as it lacked a systemic rationale of construction.

This was subsequently acknowledged in the discussion of the original taxonomy by Krathwohl et al in the revision of the taxonomy and the taxonomy reestablished on more systematic lines. It is generally considered that the role the taxonomy played in systematising a field was more important than any perceived lack of rigour in its construction.

Some critiques of Bloom's Taxonomy's (cognitive domain) admit the existence of these six categories, but question the existence of a sequential, hierarchical link. Also the revised edition of Bloom's taxonomy has moved Synthesis in higher order than Evaluation. Some consider the three lowest levels as hierarchically ordered, but the three higher levels as parallel. Others say that it is sometimes better to move to Application before introducing concepts. This thinking would seem to relate to the method of problem-based learning.

www.numerons.in

Mastery learning



Mental state in terms of challenge level and skill level, according to Csikszentmihalyi

Mastery Learning is an instructional method that presumes all children can learn if they are provided with the appropriate learning conditions. Specifically, mastery learning is a method whereby students are not advanced to a subsequent learning objective until they demonstrate proficiency with the current one.

Mastery learning curricula generally consist of discrete topics which all students begin together. Students who do not satisfactorily complete a topic are given additional instruction until they succeed. Students who master the topic early engage in enrichment activities until the entire class can progress together. Mastery learning includes many elements of successful tutoring and the independent functionality seen in high-end students. In a mastery learning environment, the teacher directs a variety of group-based instructional techniques, with frequent and specific feedback by using diagnostic, formative tests, as well as regularly correcting mistakes students make along their learning path.

www.numerons.in

Teachers evaluate students with criterion-referenced tests rather than norm-referenced tests.

Mastery learning has nothing to do with content, merely on the process of mastering it, and is based on Benjamin Bloom's Mastery for Learning model, with refinements made by Block. Mastery learning may be implemented as teacher-paced group instruction, one-to-one tutoring, or self-paced learning with programmed materials. It may involve direct teacher instruction, cooperation with classmates, or independent learning. It requires well-defined learning objectives organized into smaller, sequentially organized units. Individualized instruction has some elements in common with mastery learning, although it dispenses with group activities in favor of allowing more able or more motivated students to progress ahead of others and maximizing teacher interaction with those students who need the most assistance.

www.numerons.in

Most experiments that compared mastery learning to conventional instruction have shown that mastery learning is more effective. In one meta-analysis (Kulik, Kulik & Bangert-Drowns, 1990), the mean effect size (Cohen's d) of 103 studies was 0.52 standard deviation units, which is considered a moderately large effect size.

The concept of mastery learning can be attributed to the behaviorism principles of operant conditioning. According to operant conditioning theory, learning occurs when an association is formed between a stimulus and response (Skinner, 1984). In line with the behavior theory, mastery learning focuses on overt behaviors that can be observed and measured (Baum, 2005). The material that will be taught to mastery is broken down into small discrete lessons that follow a logical progression. In order to demonstrate mastery over each lesson, students must be able to overtly show evidence of understanding of the material before moving to the next lesson (Anderson, 2000).

www.numerons.in

In general, mastery learning programs have been shown to lead to higher achievement in all students as compared to more traditional forms of teaching (Anderson, 2000; Gusky & Gates, 1986). Despite the empirical evidence, many mastery programs in schools have been replaced by more traditional forms of instruction due to the level of commitment required by the teacher and the difficulty in managing the classroom when each student is following an individual course of learning (Anderson, 2000; Grittner, 1975).

Evolutionary educational psychology

Evolutionary educational psychology is the study of the relation between inherent folk knowledge and abilities and accompanying inferential and attributional biases as these influence academic learning in evolutionarily novel cultural contexts, such as schools and the industrial workplace. The fundamental premises and principles of this discipline are presented below.

www.numerons.in

The premises of evolutionary educational psychology

The premises state there are

(a) aspects of mind and brain that have evolved to draw the individuals' attention to and facilitate the processing of social (folk psychology), biological (folk biology), physical (folk physics) information patterns that facilitated survival or reproductive outcomes during human evolution (Cosmides & Tooby, 1994; Geary, 2005; Gelman, 1990; Pinker, 1997; Shepard, 1994; Simon, 1956);

www.numerons.in

(b) although plastic to some degree, these primary abilities are inherently constrained to the extent associated information patterns tended to be consistent across generations and within lifetimes (e.g., Caramazza & Shelton, 1998; Geary & Huffman, 2002);

(c) other aspects of mind and brain evolved to enable the mental generation of potential future social, ecological, or climatic conditions and enable rehearsal of behaviors to cope with variation in these conditions, and are now known as general fluid intelligence, or gF (including skill at everyday reasoning/problem solving; Chiappe & MacDonald, 2005; Geary, 2005; Mithen, 1996); and

(d) children are inherently motivated to learn in folk domains, with the associated attentional and behavioral biases resulting in experiences that automatically and implicitly flesh out and adapt these systems to local conditions (Gelman, 1990; Gelman & Williams, 1998; Gelman, 2003).

www.numerons.in

The principles of evolutionary educational psychology

The principles represent the foundational assumptions for an evolutionary educational psychology. The gist is knowledge and expertise that is useful in the cultural milieu or ecology in which the group is situated will be transferred across generations in the form of cultural artifacts, such as books, or learning traditions, as in apprenticeships (e.g., Baumeister, 2005; Richerson & Boyd, 2005; Flinn, 1997; Mithen, 1996). Across generations, the store of cultural knowledge accumulates and creates a gap between this knowledge base and the forms of folk knowledge and abilities that epigenetically emerge with children's self-initiated activities.

There must of course be an evolved potential to learn evolutionarily novel information and an associated bias to seek novelty during the developmental period and indeed throughout the life span; this may be related to the openness to experience dimension of personality (Geary, 1995, 2002, in press).

www.numerons.in

However, the cross-generational accumulation of knowledge across cultures, individuals, and domains (e.g., people vs. physics) has resulted in an exponential increase in the quantity of secondary knowledge available in modern societies today. For most people, the breadth and complexity of this knowledge will very likely exceed any biases to learn in evolutionary novel domains.

The creation of knowledge vs. the learning of knowledge

A related issue concerns the traits that enable the creation of biologically secondary knowledge and thus culture and the extent to which these traits overlap with the ability to learn knowledge created by others.

Stated differently, Is the goal of education to have children recreate the process of discovery, to learn the products of discovery, or some combination? Some educators have advocated a focus on the process of discovery without full consideration of the constellation of traits and opportunity that contribute to the creation of secondary knowledge (e.g., Cobb, Yackel, & Wood, 1992). In fact, research on creative-productive individuals suggests that the full constellation of traits that facilitate the discovery and creation of secondary knowledge is rare and not likely reproducible on a large scale (Simonton, 1999a, 1999b, 2003; Sternberg, 1999; Wai, Lubinski, & Benbow, 2005).

Summary

Premises

1.) Natural selection has resulted in an evolved motivational disposition to attempt to gain access to and control of the resources that have covaried with survival and reproductive outcomes during human evolution.

2.) These resources fall into three broad categories: social, biological, and physical which correspond to the respective domains of folk psychology, folk biology, and folk physics.

3.) Attentional, perceptual, and cognitive systems, including inferential and attributional biases, have evolved to process information in these folk domains and to guide control-related behavioral strategies. These systems process restricted classes of information associated with these folk domains.

4.) To cope with variation in social, ecological, or climatic conditions, systems that enabled the mental generation of these potential future conditions and enabled rehearsals of behaviors to cope with this variation evolved and the supporting attentional and cognitive mechanisms are known as general fluid intelligence and everyday reasoning.

5.) Children are biologically biased to engage in activities that recreate the ecologies of human evolution; these are manifested as social play, and exploration of the environment and objects. The accompanying experiences interact with the inherent but skeletal folk systems and flesh out these systems such that they are adapted to the local social group and ecology.

Principles

www.numerons.in

1.) Scientific, technological, and academic advances initially emerged from the cognitive and motivational systems that support folk psychology, folk biology, and folk physics. Innovations that enabled better control of ecologies or social dynamics or resulted in a coherent (though not necessarily scientifically accurate) understanding of these dynamics are likely to be retained across generations as cultural artifacts (e.g., books) and traditions

(e.g. apprenticeships). These advances result in an ever growing gap between folk knowledge and the theories and knowledge base of the associated sciences and other disciplines (e.g., literature).

2.) Schools emerge in societies in which scientific, technological, and intellectual advances result in a gap between folk knowledge and the competencies needed for living in the society.

3.) The function of schools is to organize the activities of children such that they acquire the biologically secondary competencies that close the gap between folk knowledge and the occupational and social demands of the society.

www.numerons.in

4.) Biologically secondary competencies are built from primary folk systems and the components of fluid intelligence that evolved to enable individuals to cope with variation and novelty.

5.) Children's inherent motivational bias to engage in activities that will adapt folk knowledge to local conditions will often conflict with the need to engage in activities that will result in secondary learning.

6.) The need for explicit instruction will be a direct function of the degree to which the secondary competency differs from the supporting primary systems.

ADDIE Model

The ADDIE model is the generic process traditionally used by instructional designers and training developers. The five phases—Analysis, Design, Development, Implementation, and Evaluation—represent a dynamic, flexible guideline for building effective training and performance support tools.

www.numerons.in

It is an Instructional Systems Design (ISD) model. Most of the current instructional design models are spin-offs or variations of the ADDIE model; other models include the Dick & Carey and Kemp ISD models. One commonly accepted improvement to this model is the use of rapid prototyping. This is the idea of receiving continual or formative feedback while instructional materials are being created. This model attempts to save time and money by catching problems while they are still easy to fix.

Instructional theories also play an important role in the design of instructional materials. Theories such as behaviorism, constructivism, social learning and cognitivism help shape and define the outcome of instructional materials.

Analysis Phase

In the analysis phase, the instructional problem is clarified, the instructional goals and objectives are established and the learning environment and learner's existing knowledge and skills are identified. Below are some of the questions that are addressed during the analysis phase:

www.numerons.in

- Who are the learners and what are their characteristics?
- What is the new behavioral outcome?

- What types of learning constraints exist?
- What are the delivery options?
- What are the online pedagogical considerations?
- What are the Adult Learning Theory considerations?
- What is the timeline for project completion?

Design Phase

www.numerons.in

The design phase deals with learning objectives, assessment instruments, exercises, content, subject matter analysis, lesson planning and media selection. The design phase should be systematic and specific. Systematic means a logical, orderly method of identifying, developing and evaluating a set of planned strategies targeted for attaining the project's goals. Specific means each element of the instructional design plan needs to be executed with attention to details.

These are steps involved in design phase:

- Document the project's instructional, visual and technical design strategy
- Apply instructional strategies according to the intended behavioral outcomes by domain (cognitive, affective, and psychomotor).
- Design the user interface and/or user experience
- Create prototype
- Apply visual design (graphic design)

Development Phase

www.numerons.in

The development phase is where instructional designers and developers create and assemble the content assets that were blueprinted in the design phase. In this phase, storyboards and graphics are designed. If elearning is involved, programmers develop and/or integrate technologies. Testers perform debugging procedures. The project is reviewed and revised according to the feedback received.

Implementation Phase

During the implementation phase, a procedure for training the facilitators and the learners is developed. The facilitators' training should cover the course curriculum, learning outcomes, method of delivery, and testing procedures. Preparation of the learners includes training them on new tools (software or hardware) and student registration. Implementation is also evaluation of the design.

www.numerons.in

This is also the phase where the project manager ensures that the books, hands-on equipment, tools, CD-ROMs and software are in place, and that the learning application or website is functional.

Evaluation Phase

The evaluation phase consists of two parts: formative and summative. Formative evaluation is present in each stage of the ADDIE process. Summative evaluation consists of tests designed for domain specific criterion-related referenced items and providing opportunities for feedback from the users which were identified.

Blended learning

w .in

Blended learning methodology

Blended Defined

www.numerons.in

Blended learning refers to a mixing of different learning environments. It combines traditional face to face classroom methods with more modern computer-mediated activities. The strategy creates a more integrated approach for both instructors and learners. Formerly, technology-based materials played a supporting role to face-to-face instruction. Through a blended learning approach, technology will be more important.

For example, consider a traditional class meeting schedule. Say that the the course would normally meet MWF, from 1-3 PM. If the institution were to apply a blended learning approach, the course may change so that it meets once per week instead of the usual three-session format. Learning activities that otherwise would have taken place during classroom time can be moved online.

In other circumstances, a greater reliance on technology within the classroom may occur. Activities may be structured around access to online resources, communication via social media or interaction with distance learners in other classrooms or other learning environments.

www.numerons.in

There are many different approaches to blended learning. It can take on many shapes or forms, depending on the teachers and learners involved. As of now, there is no consensus on a single agreed-upon definition for blended learning. The terms "blended," "hybrid," and "mixed-mode" are used interchangeably in current research literature.

The Many Names of Blended Learning

Blended Learning has been around for many years, but the name has changed as the uses and recognition have increased. Many people may be using a form of blended learning in lessons and teaching, but may not realize it or be able to give it an actual name. Blended learning is something that is used in the world of education as well as the world of business. Blended learning is not a new concept, but may be a new term to many users. Below is a list of just a few of the more common, but older, names of blended learning.

www.numerons.in

"You may hear blended learning described as “integrative learning”, “hybrid learning”, “multi-method learning” (Node, 2001). "The term "blended learning" is being used with increasing frequency in both academic and corporate circles. In 2003, the American Society for Training and Development identified blended learning as one of the top ten trends to emerge in the knowledge delivery industry" (cited in Rooney, 2003) (Graham, 2004).

Mixing synchronous learning and asynchronous learning

A blended learning approach can combine face-to-face facilitation with computer-mediated instruction and/or discovery learning opportunities. It also applies science or IT activities with the assistance of educational technologies using computer, cellular or Smartphones, Satellite television channels, videoconferencing and other emerging electronic media. Learners and teachers work together to improve the quality of learning and teaching, the ultimate aim of blended learning being to provide realistic practical opportunities for learners and teachers to make learning independent, useful, sustainable and ever growing.

www.numerons.in

Considerations in blended learning

Whether a course should be proposed as a face-to-face interaction, an online course or a blended course depends on the analysis of the competencies at stake, the nature and location of the audience, and the resources available. Depending on the cross-analysis of these 3 parameters, the course designer will opt for one of the 3 options. In his course scenario he/she will then have to decide which parts are online, which parts are offline. A basic example of this is a course of English as a second language where the instructor reaches the conclusion that all audio-based activities (listening comprehension, oral expression) will take place in the classroom where all text-based activities will take place online (reading comprehension, essays writing).

Blended learning increases the options for greater quality and quantity of human interaction in a learning environment. Blended learning offers learners the opportunity “to be both together and apart.” A community of learners can interact at any time and anywhere because of the benefits that computer-mediated educational tools provide. Blended learning provides a ‘good’ mix of technologies and interactions, resulting in a socially supported, constructive, learning experience; this is especially significant given the profound effect that it could have on distance learning.

www.numerons.in

In a perfect world, an ideal harmony can be created between face to face and online learning. Blended learning strives to do that. In this scenario, the benefits of both approaches would be utilized, without incurring the negative side effects of an imbalanced approach. The challenge, though, is that it is difficult to come up with a perfect prescription for how to establish a course that will be effectively blended. The needs of every course is different, as are the needs of learners in a given course. There isn't a way to set up a perfect formula that says "use 10% internet, 20% face to face interaction and 2 shakes of hugs and a lot of high fives" and then you'll have a perfect learning environment.

www.numerons.in

While it is easiest for most of us to picture a blended learning environment in a traditional classroom environment with a sprinkle of computers thrown in, there are other ways to create blended learning environments.

Researchers Russell T. Osguthorpe and Charles R. Graham from Brigham Young University suggest that there are at least three environments that are effective blended learning environments: 1. online and face-to-face learning activities, 2. online and face-to-face students, and 3. online and face-to-lace instructors.

There are a variety of motivations for utilizing blended learning environments. Obviously, educators want to maximize the benefits that any approach would offer learners. The authors described six goals that are applicable to the types of learning environments that they described: pedagogical richness, access to knowledge, social interaction, personal agency, cost effectiveness, and ease of revision.

Role of the facilitator

www.numerons.in

The facilitator can combine two or more methods of teaching. A typical example of blended learning methodology would be an integrated combination of technology-based materials and face-to-face sessions to present content. An instructor can begin a course with a well-structured introductory lesson in the classroom, and then proceed with follow-up materials online. Blended learning can also be applied to the integration of e-learning with a Learning Management System using computers in a physical classroom, along with face-to-face instruction. Guidance is suggested early in the process, to be used more sparingly as learners gain expertise.Facilitators must focus on literacy instruction, using both technology and face-to-face instruction, in order to develop independent learners so they can interact with the texts in meaningful ways. The role of the instructor is critical as this requires a transformation process to that of learning facilitator. Quite often, with the increase of baby boomers going back to school and pursuing higher education the skills required for technology use are limited. Instructors then find themselves more in the role of assisting students with computer skills and applications, helping them access the internet, and encouraging them to be independent learners through both guided and individualized instruction. Blended learning takes time for both the instructor and learner to adapt to this relatively new instructional concept.

www.numerons.in

The facilitator's role can be broken down into the following four categories: 1. developing online course content and structure 2. communication 3. guiding and individualizing learning 4. assessing, grading, and promoting.

Implications for Teacher Preparation

Following current trends, 50% of all high school classes will be offered online by 2019, yet few teacher preparation programs address online or blended learning. There is a lack of resources identifying best practices which will be crucial for addressing current problems of teacher training. Teachers need to be educated in both traditional classroom methods, but also enhanced training to develop skills targeted to online education.

www.numerons.in

The elements of teacher preparation for online learning fall into two categories. First, they need to be trained to use the available tools and technology. Secondly, they need to be trained in online pedagogy; particularly, how to communicate content without the use of contextual cues. According to Watson (2006), many online professional development programs focus on helping teachers "understand how to motivate individual learners, enhance student interaction and understanding without visual cues, tailor instruction to particular learning styles, and develop or modify interactive lessons to meet student needs." (p. 13)

The additional skills necessary for teachers utilizing online or mobile learning are: 1. Enhanced communication skills: teachers can't rely on nonverbal or proximal cues with which to address misunderstandings. Teacher preparation programs will need to help teachers develop a clarity in their instructions not required by traditional classrooms. 2. Time management (in asynchronous classes): students can be online at any time, so teachers can't predict when heavier work loads will occur. 3. Teacher planning (in synchronous classes): lessons need to have a multimedia component which requires more planning than a traditional classroom lesson 4. Differentiation: if students have different learning styles or disabilities, teachers must be able to adapt online content for them. Reaching students with physical or learning disabilities will be much different than in a traditional classroom.

www.numerons.in

While all these skills are necessary for traditional teachers, they must be strengthened to incorporate online components.

Current usage of the term

With today's prevalence of high technology in many countries, blended learning often refers specifically to the provision or use of resources which combine e-learning (electronic) or m-learning (mobile) with other educational resources, also called hybrid courses. Some would claim that key blended-learning arrangements can also involve e-mentoring or e-tutoring. These arrangements tend to combine an electronic learning component with some form of human interaction, although the involvement of an e-mentor or e-tutor does not necessarily need to be in the context of e-learning. E-mentoring or e-

www.numerons.in

tutoring can also be provided as part of a "stand alone" ("un-blended") e-tutoring or e-mentoring arrangement.

Heinze and Procter have developed the following definition for blended learning in higher education:

Blended learning is learning that is facilitated by the effective combination of different modes of delivery, models of teaching and styles of learning, and is based on transparent communication amongst all parties involved with a course.

www.numerons.in

Some of the advantages of blended learning include; cost effectiveness for both the accrediting learning institution and the learner, accessibility to a post secondary education, and flexibility in scheduling and timetabling of course work. Some of the disadvantages may include; computer and internet access, limited knowledge in the use of technology, study skills, problems which are similar to those who would be entering a physical learning institution.

It should also be noted that some authors talk about "hybrid learning" (this seems to be more common in Northern American sources) or "mixed learning". However, all of these concepts broadly refer to the integration (the "blending") of e-learning tools and techniques.

Blended learning systems and projects

www.numerons.in

The European Union's Socrates programme has funded the development of blended learning courses in nine less widely spoken European languages. The development projects, Tool for Online and Offline Language Learning TOOL are coordinated by the EuroEd Foundation, Iasi, Romania and Autonomous Language Learning ALL coordinated by CNAI, Pamplona, Spain.

Each project has developed blended learning programmes at A2 'Waystage' level in accordance with the competence descriptors defined in the CEFR (Common European Framework of Reference for Languages).

ALL: Romanian, Turkish, Lithuanian, Bulgarian. TOOL: Slovene, Dutch, Hungarian, Estonian, Maltese.

The development is large in terms of size and scope and these may well be the first blended learning courses available in these languages, representing a development for the application of modern communicative language learning techniques in these languages.

www.numerons.in

The course developments were undertaken by development teams, consisting of several partner institutions, from each country. These institutions include publicly and privately funded universities, and private language learning providers, as well as consulting specialists.

Outside the academic sector, blended learning is being used in private companies, possibly because of the cost benefits over traditional training, though no studies are available which show clear cost savings. One of the earliest commercial offerings in the sector came from Virtual College, which produced a blended learning NVQ system in 1995.

Why is Blended Learning important?

One clear advantage of blended learning in education is its connection with differentiated instruction. Differentiated instruction involves "custom-designing instruction based on student needs." In differentiated instruction, educators look at students' learning styles, interests, and abilities. Once these factors have been determined, educators decide which curriculum content, learning activities, products, and learning environments will best serve those individual students' needs. Blended learning can fit into a number of these areas. By using blended learning, educators are definitely altering the learning environment when students work collaboratively in learning communities online, for example. Teachers could also add relevant curriculum content that would be unavailable or difficult to comprehend outside of the internet. Learning activities and products can also be changed to use technologies in a classroom that uses blended learning.

In a study by Dean and associates, research showed that providing several online options in addition to traditional classroom training actually increased what students learned. (2001) Another study showed that student interaction and satisfaction improved, along with students learning more, in courses that incorporated blended learning. (DeLacey and Leonard, 2002)

www.numerons.in

Another advantage of blended learning is pacing and attendance. In most blended learning classrooms, there is the ability to study whenever the student chooses to do so. If a student is absent, she/he may view some of the missed materials at the same time that the rest of the class does, even though the student cannot be physically in the classroom. This helps students stay on track and not fall behind, which is especially helpful for students with prolonged sicknesses or injuries that prevent them from attending school. These "self-study modules" also allow learners to review certain content at any time for help in understanding a concept or to work ahead for those students who learn at a faster pace. (Alvarez, 2005)

Because of the ability of students to self-pace, there is a higher completion rate for students in blended learning classrooms than to those in strictly e-learning situations. (Flavin, 2001) This self-pacing allows for the engagement of every learner in the classroom at any given time. Students also see that the learning involved becomes a process, not individual learning events. This revelation allows for an increased application of the learning done in the classroom. (Flavin, 2001)

www.numerons.in

Blended Learning in K-12 Settings

Blended learning, whether it is in the form of online programs or bringing other technologies into a physical setting, can serve a variety of purposes for students in k-12

settings. While research and information about blended learning in colleges and universities is widely available, the same is not true for k-12 settings. Thus, this section discusses the implementation of blended learning in elementary, middle, and high school classrooms.

Online programs, for example, serve students whose needs are not met at their physical school. Many programs seek to serve students with limited educational opportunities . A lack of classes, conflicts with scheduling, un- or under-qualified teachers, and a need to make up credits or to obtain them in certain disciplines may also drive the need for online courses. Under the federal mandates of No Child Left Behind, teachers are required to be highly qualified in the content area they teach. At smaller schools and in rural areas, this is not always possible. Thus, access to highly qualified teachers may only exist through an online forum.

www.numerons.in

The following are online programs have been implemented in k-12 classrooms :

- Knowledge Building Communities
- Quest Atlantis
- Virtual Math Team
- Apex Learning
- Monterey Institute for Technology and Educations
- Compass Learning

There is more to blended learning than online courses. Teachers can enhance their existing curriculum with a number of online resources. For additional math practice, students can use online manipulatives at the National Library of Virtual Manipulatives, Math Magician to practice basic math skills, and Math IXL to access grade-specific practice in all strands of mathematics. The Reading Matrix offers students and teachers with a list of resources for all areas of language arts. For access to current events, students can read local or national newspapers online, or they can access publications specifically for students, such as Time for Kids. Science Resources Online has a list of links to sites that support students learning in science.

www.numerons.in

Educators can also use resources online to support their students' needs, tap into students' interests, to compensate for a lack of physical resources, and to foster greater communication.

Objections

Martin Oliver and Keith Trigwell voice some objections to the use of the term "Blended Learning". They point out that the term has become a bandwagon for almost any form of teaching containing "two or more different kinds of things that can then be mixed". There is no consensus over what the things are that should be mixed: examples include different media, varying pedagogical approaches, or the mix of theoretical with practical work.

www.numerons.in

Their main objection is that generally the distinctions being drawn don't exist, or aren't productive. For example, the blending of e-learning with traditional learning implies that there can be an unblended form of e-learning in which no traditional learning occurs.

They also object to the use of the term "learning," when almost all of the focus is on how teaching is deliverered and the implication is that receiving teaching is equivalent to learning.

www.numerons.in

Instructional Simulation

Instructional simulation or virtual learning environment

An instructional simulation, also called an educational simulation, is a simulation of some type of reality (system or environment) but which also includes instructional elements that help a learner explore, navigate or obtain more information about that system or environment that cannot generally be acquired from mere experimentation. Instructional simulations are typically goal oriented and focus learners on specific facts, concepts, or applications of the system or environment. Today, most universities make life-long learning possible by offering a virtual learning environment (VLE). Not only can users access learning at different times in their lives, but they can also immerse themselves in learning without physically moving to a learning facility, or interact face to face with an instructor in real time. Such VLEs vary widely in interactivity and scope. For example, there are virtual classes, virtual labs, virtual programs, virtual library, virtual training, etc. Researchers have classified VLE in 4 types: -1st generation VLE: They originated in 1992, and provided the first on line course opportunities. They consisted in a collection of learning materials, discussion forums, testing and e-mail systems all accessible on line. This type of virtual environment was static, and did not allow for interaction among the different components of the system. -2nd generation VLE: Originated in 1996, these VLE are more powerful, both in data base integration and functions - planning and administrating, creating and supporting teaching materials, testing and analyzing results. Over 80 forms exist, including Learning Space, WebCT, Top Class, COSE, Blackboard, etc. -3rd generation VLE: The novelty of 3rd generation VLE is that they incorporate the newest technologies, accessible in real and non real time (synchronous and synchronous communications), such as audio and video conferences through the internet -'one to one' and 'one to many', collaboration features for work in groups, seminars, labs, forums, and of course the learning, development, planning, library and administrative functions. Stanford On-line, InterLabs, Classroom 2000 and the system "Virtual University" (VU) are examples of this VLE. -4th generation VLE: These are the environments of the future, and represent new learning paradigms, at the center of which are the user and the 'global resources,' as opposed to the teacher and the 'local resources.' Their main advantage is that learning materials can be created, adapted and personalized to the specific needs and function of each user. Few 4th generations VLE exist, most of them still being in the planning and developing phases. One example of supportive technology is called the 'multi-agent technology,' which allows the interface of data among different systems.

www.numerons.in

www.numerons.in

History

Simulations of one form or another have been used since the early 1900s as a method for training or training. The United States Defense Modeling and Simulation Coordination Office identifies three main types of simulation: live, virtual, and constructive. Live (live action) and virtual simulations are primarily used for training purposes, whereas a constructive simulation is used to view or predict outcomes like wargaming or stockmarket behavior. Each of these types is based on some reality and is intended to provide the user with a pseudo-experience without the danger, expense, or complexity of real life.

www.numerons.in

While simulations are used for learning and training purposes, noted authors, such as Clark Aldrich and Andy Gibbons (Model-Centered Instruction) suggest that simulations in and of themselves are not instructional. Rather, a simulation only becomes instructional when instructional elements are included that help expose the learner to key parts or concepts of the system or environment. For example, an F-16 simulator is not inherently instructional because it is primarily intended to replicate the F-16 cockpit behavior and the environments the aircraft operates within. The simulator may be used for training purposes, but it requires an instructor or some other external element to identify key learning aspects of the system to the learner.

In education, simulations have had their use under a number of different names. Ken Jones in the 1980s defined simulations as interactions between people such as role-playing. Others suggest that experiential learning activities like those found in team training or ropes courses are also simulations because they replicate the human decision-making processes groups may display, albeit in a very different environment. These can be considered instructional simulations because the effective use of these simulation types include using instructional elements to help learners focus on key behaviors, concepts or principles.

www.numerons.in

With the ever decreasing cost of computing tools, virtual and constructive simulation are being used more and more. Simulation is used more and more in e-learning environments because of improved Web-authoring tools and an increasing demand for performance-based training. As a result, more non-technical personnel are involved designing simulation, a field dominated by engineers and computer scientists.

Instructional design models for simulations

Most traditional instructional design models have at least four components:

www.numerons.in

- Analysis – components usually included are a goal analysis, performance analysis, target population analysis, task analysis, media selection, and cost analysis.
- Design – including interface design, sequencing, lesson design, and learner control
- Development – a collaboration between programmers, graphic artists, writers, subject matter experts, and others during which the educational product is fully developed

- Implementation and Evaluation – delivering the final product to the learners and evaluating whether the goals were met.

ADDIE is an example of an Instructional Systems Design (ISD) model.

Effectiveness of pedagogy

When designing VLEs more functions need to be considered than in designing traditional learning modalities. The process of virtual learning consists of organizational, quality control, correctional and predictable procedures. For example, the effectiveness of the organization of student self-learning - called the 'pedagogical and didactical function' in VLEs, will depend on the following:

1. Online content that satisfies the requirements of subject matter standards, while at the same time allows engages students 'interest in the process of learning. For example, open ended inquiry-based approaches to learning allow students to have some room to pursue individual interests.
2. Level of interactivity of learning environment, to increase motivation and hands-on opportunities for learners. Simulation and animation provide excellent multisensory learning environments.
3. Time management tools for the efficient assimilation of new materials. For example, availability of timetables, schedule of synchronous consultations, embedded hyperlinks for the ready access of information, etc.
4. Maximization of activities that focus on student critical thinking, and information literacy skills, needed for the 21st century, such as acquisition, processing and synthesis of information.
5. Communication modalities between teacher and student, peer to peer and learner to experts. The role of the instructor is that of an organizer, while the student is an initiator of the learning process.

A widely used format for designing on line learning environments is WebQuest. However, there are today on the market newer models for instruction that are more interactive and integrated, such as Project Page, MiniQuest, CuriculumQuest, DecisionQuest.

Since the 1990s, trends such as the performance technology movement, constructivism, Electronic Performance Support Systems, rapid prototyping, increasing use of Internet for distance education/distance learning, and knowledge management endeavors have influenced instructional design practices These changes are producing challenges to existing design models. According to Reigeluth (1996), the education and training field is in the midst of a paradigm shift from the Industrial Revolution to the Information Age, requiring a corresponding shift from standardization to customization of instructional design. Moreover, Gros et al. (1997), posit the inflexibility of traditional linear design processes, calling for a more iterative process, while Winn (1997) and Jonassen et al. criticize the positivist assumptions that learning situations are closed systems, imparting knowledge is the instructor's responsibility, and that human behavior is predictable.

www.numerons.in

There are many alternative models that have been proposed as more conducive to the new Information Age paradigm, including new methods of instruction such as instructional gaming and simulations – Jonassen's promotion of hermeneutics, fuzzy logic and chaos theory as bases for ID, Hoffman's use of Reigeleuth's Elaboration Theory and hypermedia,Akilli & Cagiltay's FIDGE model, among others.

Hermeneutics, fuzzy logic, and chaos theory

www.numerons.in

Hermeneutics emphasizes the importance of socio-historical context in mediating the meanings of individuals creating and decoding texts. Massively multiplayer online learning environments, for example, require new social processes that go well with social constructivist, hermeneutic philosophy and methods. Chaos theory looks for order in chaotic systems, looking for repeating patterns such as fractals. It is useful for non-linear, dynamic situations or for situations where a small change in initial conditions can produce great changes later. Finally, fuzzy logic is based on the idea that reality is rarely bivalent, but rather multivalent – in other words, there are many "in-between" values that need to be designed for. Therefore, instructional models should move away from deterministic approaches and design for more probabilistic ways of thinking.

Elaboration theory (ET) and hypermedia

Key aspects of ET are:

A single organizing structure that reflects the primary focus of the course.

www.numerons.in

Sequencing from simple to complex

Sequence within the lesson: --

- For conceptually organized instruction "present the easiest, most familiar organizing concepts first" (p. 251).
- For procedures, "present the steps in order of their performance"
- For theoretically organized instruction, move from simple to complex.
- Place supporting content immediately after related organizing content.
- Adhere to learning prerequisite relationships in the content.
- Present coordinate concepts simultaneously rather than serially.
- Teach the underlying principle before its associated procedure.

Hoffman states that "the Web-like linking that characterizes hypermedia is more alike to the functioning of human cognition than is the traditional linear structure found in much educational programming", further asserting that "this kind of model could lead to the possibility of modularity and plasticity, which would bring along the ease to make changes in response to learner needs without changing the overall structure of the product and rapid development."

www.numerons.in

FIDGE (Fuzzified Instructional Design Development of Game-Like Environments) model

This model consists of dynamic phases with fuzzy boundaries, through which instructional designers move non-linearly. The main features are:

- The participants include all actively participating learners and experts
- Teams are composed of multidisciplinary, multi-skilled game-players
- The environment is socio-organizational and cultural
- The process is dynamic, fuzzy, non-linear, and creative
- Based on evaluation, change is continuous
- Evaluation is also continuous, iterative, formative and summative, embedded into each phase
- Time management and scheduling is vital for success, as well as the management of a good leader
- The model is suitable for game-like learning environments and educational games, for novice to expert level instructional designers and learners.

www.numerons.in

Virtual worlds in instructional simulation

A virtual world is an interactive 3-D environment where users are immersed in the environment. Users can manipulate the environment and interact with other users. Depending on the degree of immersion, users can begin playing a game, interact with other users, attend seminars, or complete course work for an online class. Online discussion groups and social networks such as Myspace and Facebook are already being used to supplement interaction within coursework (Baker 2009).

www.numerons.in

Sparkle is poised to become the first virtual world for the iPhone. What's more, it's being developed completely from scratch, exclusively as an MMO for the iPhone/iPod Touch. This will bring more mobility to the learner. They will no longer need to be at a desktop.

Second Life is a virtual world where users create avatars. An avatar is a virtual representation of the user to other users. These avatars then interact with any other user within the Second Life world. Avatars can purchase virtual land, own buildings, and travel, interact, conduct business, and even attend lectures by professors. Second Life is running 24 hours a day and is tied into the Internet, so there are always other avatars to interact with.

MMORPGs such as World of Warcraft and Star Wars Galaxies are video game based virtual environments. These game engines hold the potential for instructional simulation. Unlike Second Life, these are pre-designed games with their own set of objectives that need to be completed through a progression.

www.numerons.in

Uses in education

In education, virtual learning environments are simulated experiences which utilize the pedagogical strategies of instructional modeling and role playing for the teaching of new concepts. The environment in which the experiences are presented is a virtual one often accessed via a computer or other video projection interface. Immersive virtual environment headsets have been used with younger children and students with special needs. The advantages of using instructional simulators via VLEs include: students are motivated when they are able to use computers and other technology; VLEs allow for interaction, exploration, and experimentation with locations, objects, and environments that would otherwise be unavailable in the absence of the VLE; instructors can adapt programs and parameters of the virtual learning experience to meet individual learner needs; when multi-user virtual environments are used collaborative and cooperative learning is encouraged; VLEs relate to students the real-world relevance of their learning by extending concepts and skills to application in the simulated environment; and learning can occur in an emotionally and physically safe environment without detrimental consequence.

www.numerons.in

The use of instructional simulation with individuals with special needs is gaining more attention. Mitchell, Parsons, and Leonard (2007) created a "Virtual Café" program designed to teach social interaction skills to adolescents with autism spectrum disorder (ASD). The program provides feedback to guide, or scaffold, the user toward making appropriate social behavior decisions. Virtual learning environments are also beginning to be used to teach children with ASD how to respond in potentially dangerous situations such as crossing the street and evacuating a building on fire (Strickland, McAllister, Coles, and Osborne 2007). The instructional simulation provides a safe environment within which to practice appropriate response skills.

www.numerons.in

Distance learning is growing. The importance of a physical classroom is being reduced as the technology of distance learning develops (Sanders, 2006). Sanders (2006) present a warning that students may do well in distance learning environments, however they need to have engaging moments within the course. He also warns students to critically assess a new technology before adopting it as a learning tool. The virtual learning environment needs to simulate the learning process, using goals and objectives to measure the learners' achievement. Sanders (2006) uses movies like Terminator 2, The Matrix, and I, Robot as callbacks to allegorical warnings of potential mishaps of relying too much on technology. He presents possible ways to balance a distance course so that it can effectively simulate a learning environment.

Barney, Bishop, Adlong, and Bedgood (2009) studied the use of a 3D virtual laboratory as a tool to familiarize distance learning chemistry students with an actual chemistry laboratory. While it was not incorporated into the initial study, the researchers suggest including instructional scaffolding experiences to help alleviate students' anxieties with applying mathematics and chemistry concepts in the actual laboratory setting (Barney, Bishop, Adlong, and Bedgood 2009). The virtual laboratory does not replace the real-world experience, rather it helps to enhance the student's schema of a chemistry laboratory and prepare them for performance expectations in the actual environment. Web-based virtual science laboratories are also used with elementary school students. In their study, Sun, Lin,

www.numerons.in

and Yu (2008) found that students who used a web-based virtual science laboratory in conjunction with traditional teaching methods not only found the learning experience more enjoyable, they also performed better academically and received higher grades.

Baker (2009) suggests multi-user virtual environments or MUVEs have the potential to engage students. Second Life holds more of a purpose in interaction (Baker, 2009). Instructors can hold lectures; students can collaborate through chat in Second Life. When compared to a discussion board, Second Life is a viable alternative for distance learning students to develop group work skills. At Chesapeake High School in Baltimore County, Maryland, students explore the ecological environment surrounding Mt. St. Helens via a 3D virtual learning environment (Curriculum Review 2009). Students navigate through the environment with a virtual unmanned vehicle and work collaboratively to solve ecological and environmental problems that are built into the program for instructional purposes. Engaging in the VLE provides many opportunities for application, data collection, and problem solving.

www.numerons.in

Uses in medicine

Sokolowski classifies medical simulations in 3 categories: 1. Simulators based on physical models, usually referred to as the Human Patient Simulator (HPS), of which several prototype exist for different purposes (CentraLine Man, Noelle and Pediasim mannequins); 2. Virtual Reality training simulators based on computers – i.e. LapVR Surgical Simulator, and Suture Tutor; 3. a hybrid model of the first two kinds combines a realistic 3D computerized representation of an organ system, for example, with the ability to interface with it through haptic devices.

www.numerons.in

The use of simulation-based learning in the medical field has many benefits, including patient safety, accelerating diagnostic and therapeutic procedures, unfulfilled demand for medical personnel, medical cost reduction and lowering of medical errors that amount to loss of life and associated costs. The use of current technologies allow for very high fidelity simulations. These include Immersive Virtual Environments (IVEs)- computer based 3D environments known as serious games, and other very highly immersive virtual environments, such as Cave Automatic Virtual environment(CAVE),in which the student sits in a projection room wearing goggles and gloves equipped with sensors. This haptic technology activates the sense of touch, allowing the trainee to interface with a simulated patient, as well as to receive visual and auditory feedbacks, making the simulated learning experience very realistic.

According to research, the best instructional simulators, medical or otherwise, contain these elements: - provide feedback - involve repetitive practice - integrate with the curricula - possess a range of difficulty levels - involve multiple learning strategies - capture clinical variations - occur in a control environment - utilize individualized learning - define expected outcomes - possess validity.

www.numerons.in

Immersive Virtual Environments (IVEs) in medical education range from teaching simple skills (taking a patient's blood) to complex skills (internal surgery). Different medical care

providers use simulations for different purposes: emergency medical technicians, medics involved in combat environments, nurses, doctors, surgeons and medical First Responders in. IVEs simulate the human body so as to provide the student or trainee with the opportunity to realistically practice and thus become proficient as to the particular technique to be taught. IVEs are commonly used when teaching patient examination, surgical procedures and assessment (individual and collaborative). Students are relieved to know that these simulations are practice and appreciate the opportunity to make mistakes now rather than later. The use of IVEs provides a controlled, safe environment for students to learn and so the anxiety factor is reduced. Students can discuss the symptoms more openly than they could with an actual patient. At the same time, however, students use all the protocol they would with a real patient. That means they introduce themselves, address the patients by name and respect their privacy.

www.numerons.in

The use of the simulation saves lives and money by reducing medical errors, training time, operating room time and the need to replace expensive equipment. Simulation users may practice on a variety of patients, each of which has a different case history, exhibits unique symptoms, and responds to user actions with appropriate physiological responses. As in real life, patient anatomy moves with the beating of the heart and the breathing of the lungs while tissues deform, bruise and bleed. The system generates a detailed evaluation after each session, enabling users and supervisors to measure the success of simulated procedures.

Barriers to instructional simulation in medicine

www.numerons.in

Simulations in medicine have been in use as early as the 16th century when the use of training mannequins helped to reduce the high maternal and infant mortality rates. Today they have evolved, to include IVEs, CAVE, robotic surgery, etc., but they are still relatively limited in their use by the health industry. Medicine is a profession that uses very advanced technical, high risk, as well as behavioral skills. However, unlike other areas with similar requirements (such as aviation), medicine has not totally embraced the use of simulations to assist with necessary medical training. The limited use of simulations for training in the medical field can be explained by several factors, including cost control, relatively limited modeling of the human body, lack of scientific evidence of effectiveness, and resistance to change by professional in the field. (Ziv, et al. 2003). A later study, conducted by Amalberti et al.(2005), points to 5 systemic structural barriers to the use of simulators to advance medical training. These are:

- Unlimited decision-making autonomy of individual medical staff; instead, teamwork and regulations should anticipate problems and processes across departments.
- Unlimited performance of individuals and of the system; instead, hours of work should be limited and shortage of staff addressed because excessive productivity-not competence, leads to medical errors.
- Focus on status of individual; instead, standards of excellence of equivalent actors should be the goal.

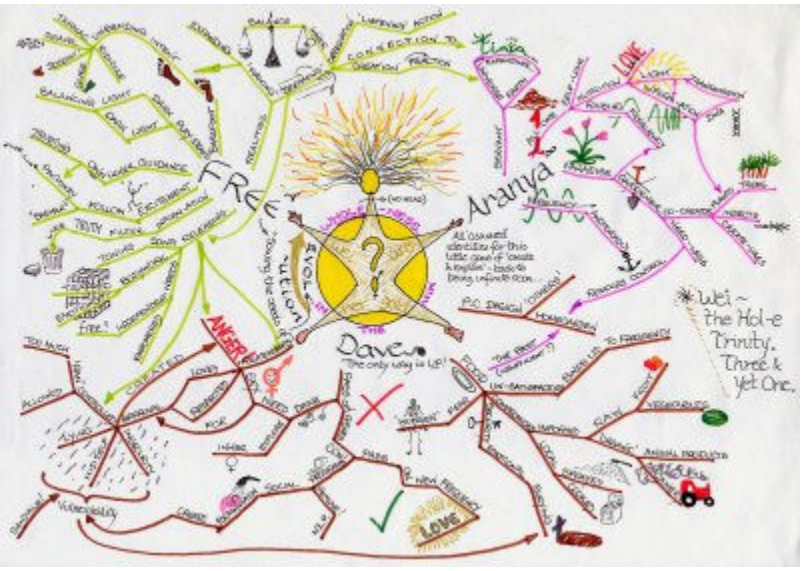
www.numerons.in

- Overprotection against personal liability; instead, more consideration should be given to "unintended consequences", and to system-level arbitration to optimize safety strategies.
- Overregulation and technical complexities in medicine; instead, simplification of regulations is needed.

The existence of these barriers leads to a lower rate of patient safety, and prevent the health industry to come closer to the goal of "ultrasafe performance," already achieved by the civil aviation and the nuclear power industries

www.numerons.in

Mind map



A hand-drawn mind map

A mind map is a diagram used to represent words, ideas, tasks, or other items linked to and arranged around a central key word or idea. Mind maps are used to generate, visualize, structure, and classify ideas, and as an aid to studying and organizing information, solving problems, making decisions, and writing.

The elements of a given mind map are arranged intuitively according to the importance of the concepts, and are classified into groupings, branches, or areas, with the goal of representing semantic or other connections between portions of information. Mind maps may also aid recall of existing memories.

By presenting ideas in a radial, graphical, non-linear manner, mind maps encourage a brainstorming approach to planning and organizational tasks. Though the branches of a mindmap represent hierarchical tree structures, their radial arrangement disrupts the prioritizing of concepts typically associated with hierarchies presented with more linear visual cues. This orientation towards brainstorming encourages users to enumerate and connect concepts without a tendency to begin within a particular conceptual framework.

www.numerons.in

The mind map can be contrasted with the similar idea of concept mapping. The former is based on radial hierarchies and tree structures denoting relationships with a central governing concept, whereas concept maps are based on connections between concepts in more diverse patterns.

Characteristics

www.numerons.in

Mind maps are, by definition, a graphical method of taking notes. Their visual basis helps one to distinguish words or ideas, often with colors and symbols. They generally take a hierarchical or tree branch format, with ideas branching into their subsections. Mind maps allow for greater creativity when recording ideas and information, as well as allowing the note-taker to associate words with visual representations. Mind maps differ from concept maps in that mind maps focus on only one word or idea, whereas concept maps connect multiple words or ideas.

A key distinction between mind maps and modelling graphs is that there is no rigorous right or wrong with mind maps, relying on the arbitrariness of mnemonic systems. A UML Diagram or a Semantic network has structured elements modelling relationships, with lines connecting objects to indicate relationship. This is generally done in black and white with a clear and agreed iconography. Mind maps serve a different purpose: they help with memory and organization. Mind maps are collections of words structured by the mental context of the author with visual mnemonics,and, through the use of colour, icons and visual links are informal and necessary to the proper functioning of the mind map.

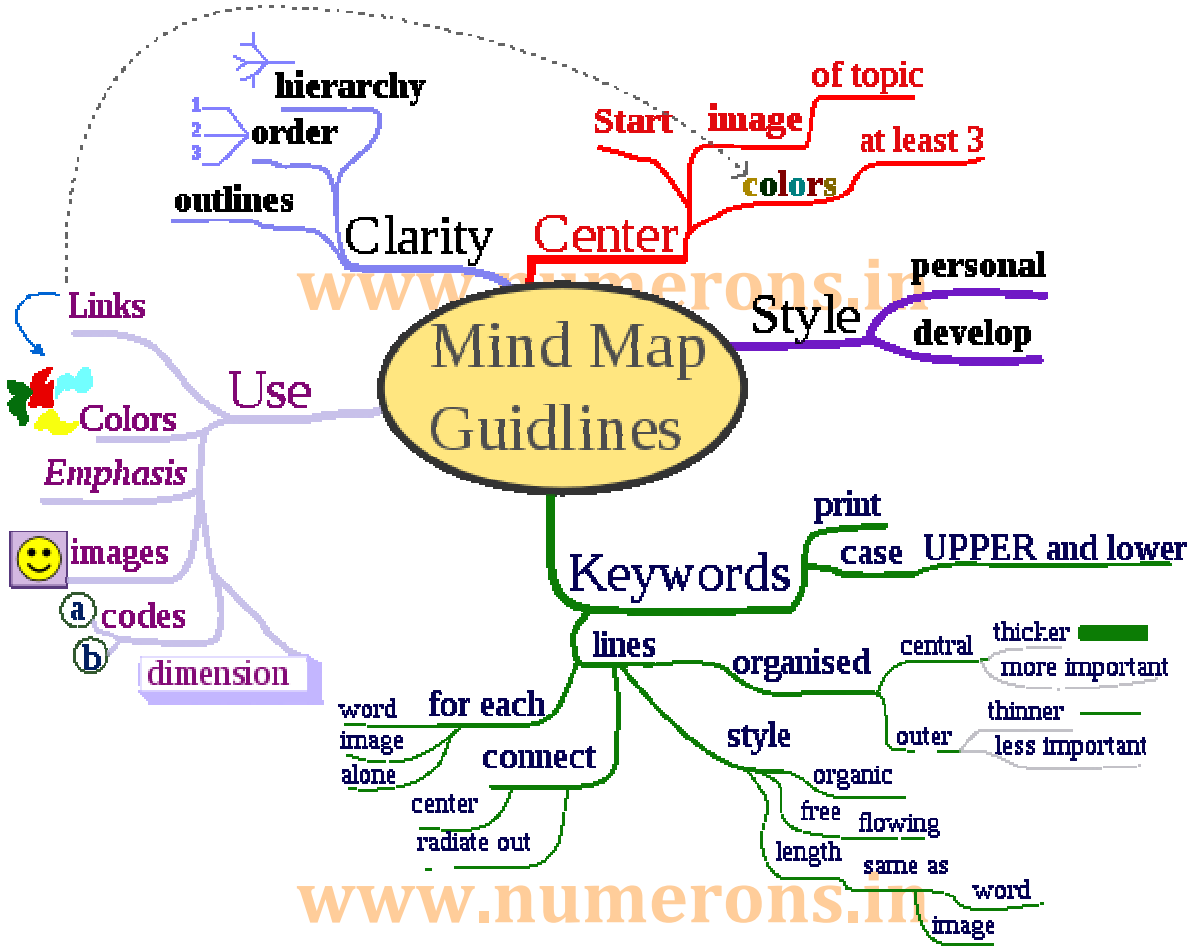
www.numerons.in

Mind map guidelines

In his books on mind maps author Tony Buzan suggests using the following guidelines for creating mind maps:

- Start in the center with an image of the topic, using at least 3 colors.
- Use images, symbols, codes, and dimensions throughout your mind map.
- Select key words and print using upper or lower case letters.
- Each word/image is best alone and sitting on its own line.
- The lines should be connected, starting from the central image. The central lines are thicker, organic and thinner as they radiate out from the centre.
- Make the lines the same length as the word/image they support.
- Use multiple colors throughout the mind map, for visual stimulation and also to encode or group.
- Develop your own personal style of mind mapping.
- Use emphasis and show associations in your mind map.
- Keep the mind map clear by using radial hierarchy, numerical order or outlines to embrace your branches.

www.numerons.in



Mind map of mind map guidelines

This list is itself more concise than a prose version of the same information and the mind map of these guidelines is itself intended to be more memorable and quicker to scan than either the prose or the list.

History

Pictorial methods for recording knowledge and modelling systems have been used for centuries in learning, brainstorming, memory, visual thinking, and problem solving by educators, engineers, psychologists, and others. Some of the earliest examples of such graphical records were developed by Porphyry of Tyros, a noted thinker of the 3rd century, as he graphically visualized the concept categories of Aristotle. Philosopher Ramon Llull (1235–1315) also used such techniques.

The semantic network was developed in the late 1950s as a theory to understand human learning and developed further by Allan M. Collins and M. Ross Quillian during the early 1960s.

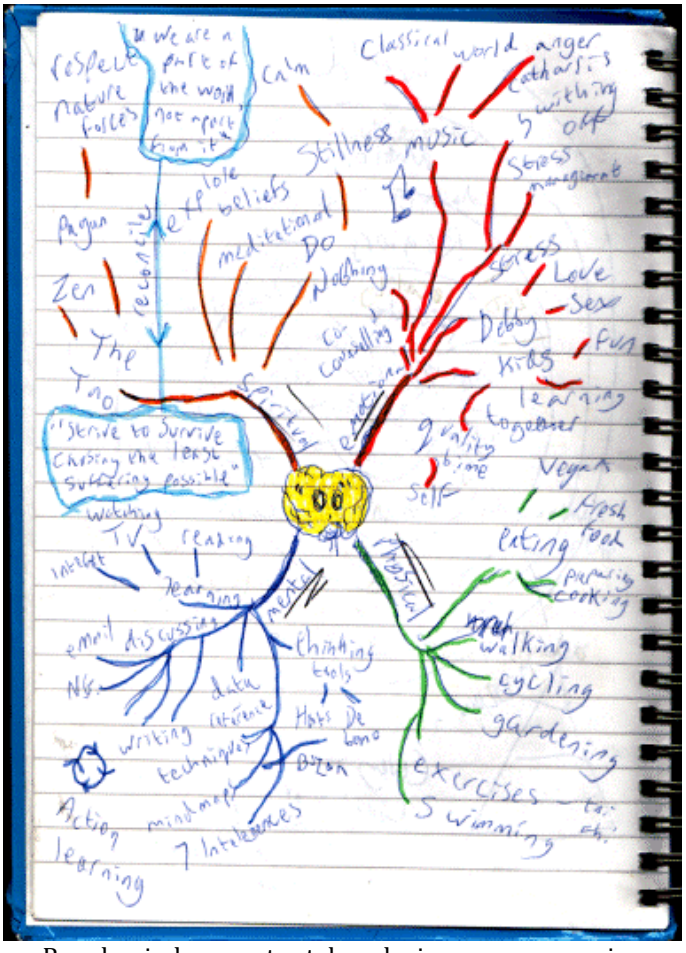
British popular psychology author Tony Buzan claims to have invented modern mind mapping. He claimed the idea was inspired by Alfred Korzybski's general semantics as popularized in science fiction novels, such as those of Robert A. Heinlein and A.E. van Vogt. Buzan argues that while "traditional" outlines force readers to scan left to right and top to bottom, readers actually tend to scan the entire page in a non-linear fashion. Buzan also uses popular assumptions about the cerebral hemispheres in order to promote the exclusive use of mind mapping over other forms of note making.

www.numerons.in

The mind map continues to be used in various forms, and for various applications including learning and education (where it is often taught as "webs", "mind webs", or "webbing"), planning, and in engineering diagramming.

When compared with the concept map (which was developed by learning experts in the 1970s) the structure of a mind map is a similar radial, but is simplified by having one central key word.

Uses



Rough mindmap notes taken during a course session

A mind map is often created around a single word or text, placed in the center, to which associated ideas, words and concepts are added.

Mind maps have many applications in personal, family, educational, and business situations, including notetaking, brainstorming (wherein ideas are inserted into the map radially around the center node, without the implicit prioritization that comes from hierarchy or sequential arrangements, and wherein grouping and organizing is reserved for later stages), summarizing, as a mnemonic technique, or to sort out a complicated idea. Mind maps are also promoted as a way to collaborate in color pen creativity sessions.

www.numerons.in

Mind maps can be used for:

- problem solving
- outline/framework design
- structure/relationship representations
- anonymous collaboration
- marriage of words and visuals
- individual expression of creativity
- condensing material into a concise and memorable format
- team building or synergy creating activity
- enhancing work morale

Despite these direct use cases, data retrieved from mind maps can be used to enhance several other applications, for instance expert search systems, search engines and search and tag query recommender. To do so, mind maps can be analysed with classic methods of information retrieval to classify a mind map's author or documents that are linked from within the mind map.

www.numerons.in

Mindmaps can be drawn by hand, either as "rough notes" during a lecture or meeting, for example, quality. An example of a rough mind map is illustrated. There are also a number of software packages available for producing mind maps.

Effectiveness in learning

Buzan claims that the mind map is a vastly superior note taking method because it does not lead to a "semi-hypnotic trance" state induced by other note forms. Buzan also argues that the mind map uses the full range of left and right human cortical skills, balances the brain, taps into the alleged "99% of your unused mental potential", as well as intuition (which he calls "superlogic"). However, scholarly research suggests that such claims may actually be marketing hype based on the 10% of brain myth and exaggeration of the importance of lateralization of brain function. Critics argue that hemispheric specialization theory has been identified as pseudoscientific when applied to mind mapping.

www.numerons.in

Farrand, Hussain, and Hennessy (2002) found that spider diagrams (similar to concept maps) had a limited but significant impact on memory recall in undergraduate students (a 10% increase over baseline for a 600-word text only) as compared to preferred study

methods (a 6% increase over baseline). This improvement was only robust after a week for those in the diagram group and there was a significant decrease in motivation compared to the subjects' preferred methods of note taking. Farrand et al. suggested that learners preferred to use other methods because using a mind map was an unfamiliar technique, and its status as a "memory enhancing" technique engendered reluctance to apply it. Nevertheless the conclusion of the study was "Mind maps provide an effective study technique when applied to written material. However before mind maps are generally adopted as a study technique, consideration has to be given towards ways of improving motivation amongst users."

www.numerons.in

Pressley, VanEtten, Yokoi, Freebern, and VanMeter (1998) found that learners tended to learn far better by focusing on the content of learning material rather than worrying over any one particular form of note taking.

Tools

Mind mapping software can be used to organize large amounts of information, combining spatial organization, dynamic hierarchical structuring and node folding. Software packages can extend the concept of mind mapping by allowing individuals to map more than thoughts and ideas with information on their computers and the internet, like spreadsheets, documents, internet sites and images.

Trademarks

www.numerons.in

Psychologist Edward Tolman is credited with the creation of cognitive mapping. The use of the term "Mind Maps" is claimed as a trademark by The Buzan Organisation, Ltd. in the United Kingdom and the United States. The trademark does not appear in the records of the Canadian Intellectual Property Office. In the US "Mind Maps" is trademarked as a "service mark" expressly for "EDUCATIONAL SERVICES, NAMELY, CONDUCTING COURSES IN SELF-IMPROVEMENT" — other products and services are not covered by the trademark.

Information mapping

Information Mapping is a technique of dividing and labeling information for easy comprehension, use, and recall. It was originally developed by Robert E. Horn.

Overview

Information Mapping™ is a research-based approach for creating structured documents and communications that are clear, concise, and user-focused. This is done by analyzing, organizing, and presenting information based on audience needs and the purpose of the information. The method is both subject-matter and media independent.

www.numerons.in

Robert Horn and his colleagues identified dozens of common documentation types, then analyzed them into structural components called information blocks. They identified over

200 common block types. These were assembled into "information types" using "information maps".

According to Mr. Horn and his colleagues, the six most common information types are: Procedure, Process, Principle, Concept, Fact, and Structure, with the goal being to produce measurable results, changing the way people write and work.

Mr. Horn's research-based, structured authoring methodology (The Method) forms the foundation of all of his company's (Information Mapping™, Inc.) services: content development and management tools, professional services, and training. Institutions such as the University of Maryland's Human Computer Interaction (HCI) program and organizations such as the Parsons Institute for Information Mapping™ have extended this methodology to include greater graphic design, visualization, technology, and knowledge management capabilities into the process of mapping information.

The concept of information Mapping™ has close ties to the fields of: information visualization, information architecture, graphic design, information design, and data analysis. The field has responded to advances in Information Technology to also closely tie to: user experience design, graphic user interface design, and knowledge management systems.

www.numerons.in

Programmed instruction

Programmed instruction is the name of the technology invented by the behaviorist B.F. Skinner to improve teaching. It is based on his theory of verbal behavior as a means to accelerate and increase conventional educational learning.

www.numerons.in

Programmed instruction

It typically consists of self-teaching with the aid of a specialized textbook or teaching machine that presents material structured in a logical and empirically developed sequence or sequences. Programmed instruction may be presented by a teacher as well, and it has been argued that the principles of programmed instruction can improve classic lectures and textbooks. Programmed instruction allows students to progress through a unit of study at their own rate, checking their own answers and advancing only after answering correctly. In one simplified form of PI, after each step, they are presented with a question to test their comprehension, then are immediately shown the correct answer or given additional information. However the objective of the instructional programming is to present the material in very small increments. The more sophisticated forms of programmed instruction may have the questions or tasks programmed well enough that the presentation and test model—an extropolation from traditional and classical instruction—is not necessarily utilized.

www.numerons.in

Programmed learning

This idea was later adapted by Robert M. Gagné, who invented programmed learning for use in teaching in schools. The difference between programmed instruction (PI) and programmed learning (PL) is that PI is intended to modify behavior, whereas PL is used for teaching facts and skills.

Personalized System of Instruction

Personalized System of Instruction or (PSI), developed by Fred S. Keller, was another idea for how to incorporate programmed learning into the classroom.

www.numerons.in

Errorless discrimination

Programmed instruction resulted from early efforts to implement Skinner's basic research findings on learning at Harvard that led to "errorless discrimination" techniques being developed. Programmed instruction had some early success in aphasia rehabilation.

Programmed instruction today

While not popular, programmed instruction continues to be used today. Recently, the application of programmed instruction principles was applied to training in computer programs and combined with Benjamin Bloom's taxonomy to teach college students. Some have argued that there is a resurgence of research on programmed instruction due to use of computers and the internet.

www.numerons.in

Rubric (academic)

A rubric is an assessment tool for communicating expectations of quality. Rubrics support student self-reflection and self-assessment as well as communication between assessor and assessee. A rubric is a set of criteria and standards typically linked to learning objectives that is used to assess or communicate about product, performance, or process tasks.

A rubric is an attempt to communicate expectations of quality around a task. In many cases, rubrics are used to delineate consistent criteria for grading. Because the criteria are public, a rubric allows teachers and students alike to evaluate criteria, which can be complex and subjective. A rubric can also provide a basis for self-evaluation, reflection, and peer review. It is aimed at accurate and fair assessment, fostering understanding and indicating the way to proceed with subsequent learning/teaching. This integration of performance and feedback is called ongoing assessment or formative assessment.

A rubric can best support the teaching and learning process when it is shared with the learner at the beginning of task creation or development process. Pamela Flash states that “When students are apprised of grading criteria from the start, they can be more involved in the process of working toward success.” Additionally, a rubric developed with learners can increase their understanding of the task and the expectations around quality.

www.numerons.in

Rubrics are generally thought to promote more consistent grading and to develop self-evaluation skills in students as they monitor their performance relative to the rubric. However, rubrics are not without their critics who are concerned that rubrics can never truly capture the complexity of written work. If rubrics are to be useful, they must capture all the actual objectives of an assignment.

The following common features of rubrics can be distinguished, according to Bernie Dodge and Nancy Pickett:

www.numerons.in

- focus on measuring a stated objective (performance, behavior, or quality)
- use a range to rate performance
- contain specific performance characteristics arranged in levels indicating the degree to which a standard has been met.

Components of a rubric

Scoring rubrics include one or more dimensions on which performance is rated, definitions and examples that illustrate the attribute(s) being measured and a rating scale for each dimension. Dimensions are generally referred to as criteria, the rating scale as levels, and definitions as descriptors.

Herman, Aschbacher, and Winters distinguish the following elements of a scoring rubric:

www.numerons.in

- One or more traits or dimensions that serve as the basis for judging the student response
- Definitions and examples to clarify the meaning of each trait or dimension
- A scale of values on which to rate each dimension
- Standards of excellence for specified performance levels accompanied by models or examples of each level

Since the 1980s, many rubrics are presented in a graphic format, typically a grid. Studies of rubric effectiveness now consider the efficiency of a grid over, say, a text-based list of criteria.

Steps to create a rubric

Rubrics help students become thoughtful evaluators of their own and others' work and reduce the amount of time teachers spend evaluating student work. Here is a seven-step method to creating and using a rubric for writing assignments.

www.numerons.in

- The first step is to have students look at models of good versus "not-so-good" work. A teacher could provide sample assignments of variable quality for students to review.
- The second step is to list the criteria to be used in the rubric and allow for discussion of what counts as quality work. Asking for student feedback during the

creation of the list also allows the teacher to globally assess the students' writing experiences.

- The third step in creating a rubric is to articulate gradations of quality. These hierarchical categories should concisely describe the levels of quality (ranging from bad to good). They can be based on the discussion of the good versus not-so-good work samples. Using a conservative number of gradations keeps the rubric user friendly while allowing for fluctuations that exist within the average range ("Creating Rubrics").
- The fourth step in creating a rubric is to practice on models. Students can test the rubrics on sample assignments provided by the instructor. This practice can build a student's confidence by teaching them how the instructor would use the rubric on their papers. It can also facilitate student/teacher agreement on the reliability of the rubric.
- The fifth step is to ask for self and peer-assessment.
- The sixth step is to revise the work based on that feedback. As students are working on their assignment, they can be stopped occasionally to do a self-assessment and then give and receive evaluations from their peers. Revisions should be based on the feedback they receive.
- The seventh and final step is to use teacher assessment, which means using the same rubric the students used to assess their work.

Usage

Rubrics are often used in alternative assessments in education but have gained ground as a way of establishing written guidelines or standards of assessments for formal, professionally-administered essay tests like certain teacher assessment exams found in the PRAXIS series. In alternative assessment, rubrics are designed to reflect the processes and outputs of "real-life" problem solving. It is usually in the form of a matrix with a mutually agreed upon negotiated contract or criteria for success. The rubric focuses on stated objectives, which should be tied to the educational standards as established by the community, and should use a range or scale to rate the performance.

The key advantage for classroom teachers is that rubrics force clarification of success in the classroom, establishing clear benchmarks for achievement. By sharing scoring rubrics with students, they become aware of the expected standards and thus know what counts as quality work. With rubrics, grading becomes more objective, consistent, and defensible. Additionally, rubrics make grading more efficient. Time spent developing a grading rubric will be made up for in ease and speed of actual grading.

According to R. Sabetiashraf, rubrics serve a different role in different phases of assessment:

- During the pre-assessment phase, rubrics are used to clarify expectations and grading methods with learners. As a result, learners can perform a self-assessment prior to submission of their work.

www.numerons.in

- During the assessment phase, rubrics help evaluators to remain focused on the preset standards of excellence and objectively assess the learner.
- During the post-assessment phase learners are given a scored rubric with clear explanation of their grade. They are made aware of their weaknesses and strengths.

Etymology

Root: Red, red ochre, red ink. Usage: Rubric refers to decorative text or instructions in medieval documents that were penned in red ink. In modern academia, rubrics have come to refer to an assessment tool.

Technical

One problem with rubrics is that each level of fulfillment encompasses a wide range of marks. For example, if two students both receive a 'level four' mark on the Ontario system, one might receive an 80% while the other receives 100%.

In addition, a small change in rubric evaluation caused by a small mistake may lead to an unnecessarily large change in numerical grade. Both of these problems may be addressed by the use of finer gradations in rubric evaluations.

Rubrics may also make marking schemes more complicated for students. Firstly, showing one mark may be inaccurate, as receiving perfect in one section may not be very significant in the long run if that specific strand is not weighted heavily. Some may also find it difficult to comprehend an assignment having four distinct marks, which may make it unsuitable for some younger children. Nonetheless, it allows for students to compensate a lack of ability in one strand by improving another one. Therefore, if a student has difficulty communicating his/her ideas, they may still be able to attain a relatively high mark, as communication is typically not weighted heavily. Rubrics may also allow students to better their weaknesses.

Another advantage of a grading rubric is that it clearly shows what criteria must be met for a student to demonstrate quality on a product, process, or performance task.

Learning styles

Learning styles are various approaches or ways of learning. They involve educating methods, particular to an individual, that are presumed to allow that individual to learn best. Most people prefer an identifiable method of interacting with, taking in, and processing stimuli or information. Based on this concept, the idea of individualized "learning styles" originated in the 1970s, and acquired "enormous popularity".

Proponents of learning styles contend that teachers should assess the learning styles of their students and adapt their classroom methods to best fit each student's learning style--an approach that is often termed the 'meshing hypothesis.

The empirical evidence underlying learning styles tests and theories has been severely criticized in recent years. Although children and adults will often express personal preferences, a recent review commissioned by the Association for Psychological Science was unable to uncover any evidence that tailoring instruction to these preferences actually produces any better learning outcomes (see discussion of The 2009 APS Critique below). Moreover, according to the same review, the few well-designed studies conducted in this area have tended to produce results that "flatly contradict the popular meshing hypothesis"..

www.numerons.in

Models

David Kolb's model

The David A. Kolb styles model is based on the Experiential Learning Theory, as explained in his book Experiential Learning: Experience as the source of learning and development (1984). The ELT model outlines two related approaches toward grasping experience: Concrete Experience and Abstract Conceptualization, as well as two related approaches toward transforming experience: Reflective Observation and Active Experimentation. According to Kolb's model, the ideal learning process engages all four of these modes in response to situational demands. In order for learning to be effective, all four of these approaches must be incorporated. As individuals attempt to use all four approaches, however, they tend to develop strengths in one experience-grasping approach and one experience-transforming approach. The resulting learning styles are combinations of the individual's preferred approaches. These learning styles are as follows:

www.numerons.in

- Converger;
- Diverger;
- Assimilator;
- Accommodator;

Convergers are characterized by abstract conceptualization and active experimentation. They are good at making practical applications of ideas and using deductive reasoning to solve problems.

Divergers tend toward concrete experience and reflective observation. They are imaginative and are good at coming up with ideas and seeing things from different perspectives.

Assimilators are characterized by abstract conceptualization and reflective observation. They are capable of creating theoretical models by means of inductive reasoning.

www.numerons.in

Accommodators use concrete experience and active experimentation. They are good at actively engaging with the world and actually doing things instead of merely reading about and studying them.

Kolb's model gave rise to the Learning Style Inventory, an assessment method used to determine an individual's learning style. An individual may exhibit a preference for one of the four styles – Accommodating, Converging, Diverging and Assimilating – depending on their approach to learning via the experiential learning theory model.

Honey and Mumford's model

In the mid 1970's Peter Honey and Alan Mumford adapted David Kolb's model for use with a population of middle/senior managers in business. They published their version of the model in The Manual of Learning Styles (1982) and Using Your Learning Styles (1983).

Two adaptations were made to Kolb's experiential model. Firstly, the stages in the cycle were renamed to accord with managerial experiences of decision making/problem solving. The Honey & Mumford stages are:

- Having an experience
- Reviewing the experience
- Concluding from the experience
- Planning the next steps.

Secondly, the styles were directly aligned to the stages in the cycle and named Activist, Reflector, Theorist and Pragmatist. These are assumed to be acquired preferences that are adaptable, either at will or through changed circumstances, rather than being fixed personality characteristics. The Honey & Mumford Learning Styles Questionnaire (LSQ) is a self-development tool and differs from Kolb's Learning Style inventory by inviting managers to complete a checklist of work-related behaviours without directly asking managers how they learn. Having completed the self-assessment, managers are encouraged to focus on strengthening underutilised styles in order to become better equipped to learn from a wide range of everyday experiences.

A MORI survey commissioned by [The Campaign for Learning] in 1999 found the Honey & Mumford LSQ to be the most widely used system for assessing preferred learning styles in the local government sector in the UK.

Anthony Gregorc's model

Dennis W. Mills, Ph.D., discusses the work of Anthony F. Gregorc and Kathleen A. Butler in his article entitled "Applying What We Know: Student Learning Styles". Gregorc and Butler worked to organize a model describing how the mind works. This model is based on the existence of perceptions—our evaluation of the world by means of an approach that makes sense to us. These perceptions in turn are the foundation of our specific learning strengths, or learning styles.

In this model, there are two perceptual qualities 1) concrete and 2) abstract; and two ordering abilities 1) random and 2) sequential.

www.numerons.in

Concrete perceptions involve registering information through the five senses, while abstract perceptions involve the understanding of ideas, qualities, and concepts which cannot be seen.

In regard to the two ordering abilities, sequential involves the organization of information in a linear, logical way and random involves the organization of information in chunks and in no specific order.

www.numerons.in

Both of the perceptual qualities and both of the ordering abilities are present in each individual, but some qualities and ordering abilities are more dominant within certain individuals.

There are four combinations of perceptual qualities and ordering abilities based on dominance: 1) Concrete Sequential; 2) Abstract Random; 3) Abstract Sequential; 4) Concrete Random. Individuals with different combinations learn in different ways—they have different strengths, different things make sense to them, different things are difficult for them, and they ask different questions throughout the learning process.

Sudbury model of democratic education

Some critics (Mazza) of today's schools, of the concept of learning disabilities, of special education, and of response to intervention, take the position that every child has a different learning style and pace and that each child is unique, not only capable of learning but also capable of succeeding.

www.numerons.in

Sudbury Model democratic schools assert that there are many ways to study and learn. They argue that learning is a process you do, not a process that is done to you. That is true of everyone; it's basic. The experience of Sudbury model democratic schools shows that there are many ways to learn without the intervention of teaching, to say, without the intervention of a teacher being imperative. In the case of reading for instance in the Sudbury model democratic schools, some children learn from being read to, memorizing the stories and then ultimately reading them. Others learn from cereal boxes, others from games instructions, others from street signs. Some teach themselves letter sounds, others syllables, others whole words. Sudbury model democratic schools adduce that in their schools no one child has ever been forced, pushed, urged, cajoled, or bribed into learning how to read or write; and they have had no dyslexia. None of their graduates are real or functional illiterates, and no one who meets their older students could ever guess the age at which they first learned to read or write. In a similar form students learn all the subjects, techniques, and skills in these schools.

www.numerons.in

Describing current instructional methods as homogenization and lockstep standardization, alternative approaches are proposed, such as the Sudbury Model of Democratic Education schools, an alternative approach in which children, by enjoying personal freedom thus encouraged to exercise personal responsibility for their actions, learn at their own pace and style rather than following a compulsory and chronologically-based curriculum.

Proponents of unschooling have also claimed that children raised in this method learn at their own pace and style, and do not suffer from learning disabilities.

Gerald Coles asserts that there are partisan agendas behind the educational policy-makers and that the scientific research that they use to support their arguments regarding the teaching of literacy are flawed. These include the idea that there are neurological explanations for learning disabilities.

www.numerons.in

Fleming's VAK/VARK model

One of the most common and widely-used categorizations of the various types of learning styles is Fleming's VARK model (sometimes VAK) which expanded upon earlier Neuro-linguistic programming (VARK) models:

- visual learners;
- auditory learners;
- kinesthetic learners or tactile learners.

Fleming claimed that visual learners have a preference for seeing (think in pictures; visual aids such as overhead slides, diagrams, handouts, etc.). Auditory learners best learn through listening (lectures, discussions, tapes, etc.). Tactile/kinesthetic learners prefer to learn via experience—moving, touching, and doing (active exploration of the world; science projects; experiments, etc.). Its use in pedagogy allows teachers to prepare classes that address each of these areas. Students can also use the model to identify their preferred learning style and maximize their educational experience by focusing on what benefits them the most.

www.numerons.in

Other models

Aiming to explain why aptitude tests, school grades, and classroom performance often fail to identify real ability, Robert J. Sternberg listed various cognitive dimensions in his book Thinking Styles (1997). Several other models are also often used when researching learning styles. This includes the Myers Briggs Type Indicator (MBTI) and the DISC assessment.

A more recent evidence based model of learning

Chris J Jackson's neuropsychological hybrid model of learning in personality argues Sensation Seeking provides a core biological drive of curiosity, learning and exploration. A high drive to explore leads to dysfunctional learning consequences unless cognitions such as goal orientation, conscientiousness, deep learning and emotional intelligence re-express it in more complex ways to achieve functional outcomes such as high work performance. The model aims to explain many forms of functional behaviour (such as entrepreneurial activity, work performance, educational success) as well as dysfunctional behaviour (such as delinquency and anti-social behaviour).

www.numerons.in

Assessment Methods

Learning Style Inventory

The Learning Style Inventory (LSI) is connected with Kolb's model and is used to determine a student's learning style. The LSI assesses an individual's preferences and needs regarding the learning process. It does the following: (1) allows students to designate how they like to learn and indicates how consistent their responses are, (2) provides computerized results which show the student's preferred learning style, (3) provides a foundation upon which teachers can build in interacting with students, (4) provides possible strategies for accommodating learning styles, (5) provides for student involvement in the learning process; 6) provides a class summary so students with similar learning styles can be grouped together.

www.numerons.in

Other methods

Other methods (usually questionnaires) used to identify learning styles include Fleming's VARK Learning Style Test, Jackson's Learning Styles Profiler (LSP), and the NLP meta programs based iWAM questionnaire. Many other tests have gathered popularity and various levels of credibility among students and teachers.

Criticism

Learning-style theories have been criticized by many.

www.numerons.in

Some psychologists and neuroscientists have questioned the scientific basis for and the theories on which they are based. According to Susan Greenfield the practice is "nonsense" from a neuroscientific point of view: "Humans have evolved to build a picture of the world through our senses working in unison, exploiting the immense interconnectivity that exists in the brain."

Many educational psychologists believe that there is little evidence for the efficacy of most learning style models, and furthermore, that the models often rest on dubious theoretical grounds. According to Stahl, there has been an "utter failure to find that assessing children's learning styles and matching to instructional methods has any effect on their learning." Guy Claxton has questioned the extent that learning styles such as VARK are helpful, particularly as they can have a tendency to label children and therefore restrict learning.

The critique made by Coffield, et al.

www.numerons.in

A non-peer-reviewed literature review by authors from the University of Newcastle upon Tyne identified 71 different theories of learning style. This report, published in 2004, criticized most of the main instruments used to identify an individual's learning style. In conducting the review, Coffield and his colleagues selected 13 of the most influential models for closer study, including most of the models cited on this page. They examined the

theoretical origins and terms of each model and the instrument that was purported to assess types of learning style defined by the model. They analyzed the claims made by the author(s), external studies of these claims and independent empirical evidence of the relationship between the 'learning style' identified by the instrument and students' actual learning. Coffield's team found that none of the most popular learning style theories had been adequately validated through independent research, leading to the conclusion that the idea of a learning cycle, the consistency of visual, auditory and kinesthetic preferences and the value of matching teaching and learning styles were all "highly questionable."

www.numerons.in

One of the most widely-known theories assessed by Coffield's team was the learning styles model of Dunn and Dunn, a VAK model. This model is widely used in schools in the United States, and 177 articles have been published in peer-reviewed journals referring to this model. The conclusion of Coffield et al. was as follows:

Despite a large and evolving research programme, forceful claims made for impact are questionable because of limitations in many of the supporting studies and the lack of independent research on the model.

Coffield's critique of Gregorc's Style Delineator

Coffield's team claimed that another model, Gregorc's Style Delineator (GSD), was "theoretically and psychometrically flawed" and "not suitable for the assessment of individuals."

www.numerons.in

The critique regarding Kolb's model

Mark K. Smith compiled and reviewed some critiques of Kolb's model in his article, "David A. Kolb on Experiential Learning". According to Smith's research, there are six key issues regarding the model. They are as follows: 1) the model doesn't adequately address the process of reflection; 2) the claims it makes about the four learning styles are extravagant; 3) it doesn't sufficiently address the fact of different cultural conditions and experiences; 4) the idea of stages/steps doesn't necessarily match reality; 5) it has only weak empirical evidence; 6) the relationship between learning processes and knowledge is more complex than Kolb draws it.

Other critiques

Coffield and his colleagues and Mark Smith are not alone in their judgements. Demos, a UK think tank, published a report on learning styles prepared by a group chaired by David Hargreaves that included Usha Goswami from Cambridge University and David Wood from the University of Nottingham. The Demos report said that the evidence for learning styles was "highly variable", and that practitioners were "not by any means frank about the evidence for their work."

www.numerons.in

Cautioning against interpreting neuropsychological research as supporting the applicability of learning style theory, John Geake, Professor of Education at the UK's Oxford

Brookes University, and a research collaborator with Oxford University's Centre for Functional Magnetic Resonance Imaging of the Brain, commented that

We need to take extreme care when moving from the lab to the classroom. We do remember things visually and aurally, but information isn't defined by how it was received.

The 2009 APS Critique

www.numerons.in

The Association for Psychological Science (APS) commissions panels of leading psychologists and cognitive scientists to evaluate topics of public interest, and publishes their reports in Psychological Science in the Public Interest. As one commentator described it, the journal "has an interesting premise. The editor recruits three or four top researchers to review the scientific literature on a complex topic of public import. The researchers must be knowledgeable, but not directly involved in prior research on the topic, so that they will be impartial."

In late 2009, Psychological Science in the Public Interest published a report on the scientific validity of learning styles practices (Pashler et al., 2009). The panel was chaired by Hal Pashler (University of California, San Diego); the other members were Mark McDaniel (Washington University), Doug Rohrer (University of South Florida), and Robert Bjork (University of California, Los Angeles). The panel concluded that an adequate evaluation of the learning styles hypothesis – the idea that optimal learning demands that students receive instruction tailored to their learning styles – requires a particular kind of study. Specifically, students should be grouped into the learning style categories that are being evaluated (e.g., visual learners vs. verbal learners), and then students in each group must be randomly assigned to one of the learning methods (e.g., visual learning or verbal learning), so that some students will be "matched" and others will be "mismatched." At the end of the experiment, all students must sit for the same test. If the learning style hypothesis is correct, then, for example, visual learners should learn better with the visual method, whereas auditory learners should learn better with auditory method. Notably, other authors have reached the same conclusion (e.g., Massa & Mayer, 2006).

www.numerons.in

As disclosed in the report, the panel found that studies utilizing this essential research design were virtually absent from the learning styles literature. In fact, the panel was able to find only a few studies with this research design, and all but one of these studies were negative findings - that is, they found that the same learning method was superior for all kinds of students (e.g., Massa & Mayer, 2006).

Furthermore, the panel noted that, even if the requisite finding were obtained, the benefits would need to be large, and not just statistically significant, before learning style interventions could be recommended as cost-effective. That is, the cost of evaluating and classifying students by their learning style, and then providing customized instruction would need to be more beneficial than other interventions (e.g., one-on-one tutoring, after school remediation programs, etc.).

www.numerons.in

As a consequence, the panel concluded, "at present, there is no adequate evidence base to justify incorporating learning styles assessments into general educational practice. Thus, limited education resources would better be devoted to adopting other educational practices that have strong evidence base, of which there are an increasing number."

The article incited critical comments from some defenders of learning styles. The Chronicle of Higher Education reported that Robert Sternberg from Tufts University spoke out against the paper: "Several of the most-cited researchers on learning styles, Mr. Sternberg points out, do not appear in the paper's bibliography." This charge was also discussed by Science Magazine, which reported that Pashler said, "Just so…most of [the evidence] is 'weak.'"

www.numerons.in

Applications: Learning styles in the classroom

Various researchers have attempted to provide ways in which learning style theory can take effect in the classroom. Two such scholars are Dr. Rita Dunn and Dr. Kenneth Dunn.

In their book, Teaching Students Through Their Individual Learning Styles: A Practical Approach, they give a background of how learners are affected by elements of the classroom and follow it with recommendations of how to accommodate students' learning strengths. Dunn and Dunn write that "learners are affected by their: (1) immediate environment (sound, light, temperature, and design); (2) own emotionality (motivation, persistence, responsibility, and need for structure or flexibility); (3) sociological needs (self, pair, peers, team, adult, or varied); and (4) physical needs (perceptual strengths, intake, time, and mobility)".

www.numerons.in

They analyze other research and make the claim that not only can students identify their preferred learning styles, but that students also score higher on tests, have better attitudes, and are more efficient if they are taught in ways to which they can more easily relate. Therefore, it is to the educator's advantage to teach and test students in their preferred styles.

Although learning styles will inevitably differ among students in the classroom, Dunn and Dunn say that teachers should try to make changes in their classroom that will be beneficial to every learning style. Some of these changes include room redesign, the development of small-group techniques, and the development of Contract Activity Packages. Redesigning the classroom involves locating dividers that can be used to arrange the room creatively (such as having different learning stations and instructional areas), clearing the floor area, and incorporating student thoughts and ideas into the design of the classroom.

www.numerons.in

Small-group techniques often include a "circle of knowledge" in which students sit in a circle and discuss a subject collaboratively as well as other techniques such as team learning and brainstorming. Contract Activity Packages are educational plans that facilitate learning by using the following elements: 1) clear statement of what the students needs to learn; 2) multisensory resources (auditory, visual, tactile, kinesthetic) that teach the required information; 3) activities through which the newly-mastered information can be

used creatively; 4) the sharing of creative projects within small groups of classmates; 5) at least 3 small-group techniques; 6) a pre-test, a self-test, and a post-test.

Another scholar who believes that learning styles should have an effect on the classroom is Marilee Sprenger, as evidenced by her book, Differentiation through Learning Styles and Memory.

Sprenger bases her recommendations for classroom learning on three premises: 1) Teachers can be learners, and learners can be teachers. We are all both. 2) Everyone can learn under the right circumstances. 3) Learning is fun! Make it appealing.

She details various ways in which teachers can teach so that students will remember. She categorizes these teaching methods according to which learning style they fit—visual, auditory, or tactile/kinesthetic.

Methods for visual learners include ensuring that students can see words written down, using pictures when describing things, drawing time lines for events in history, writing assignments on the board, using overhead transparencies/handouts, and writing down instructions.

Methods for auditory learners include repeating difficult words and concepts aloud, incorporating small-group discussion, organizing debates, listening to books on tape, writing oral reports, and encouraging oral interpretation.

Methods for tactile/kinesthetic learners include providing hands-on activities (experiments, etc.), assigning projects, having frequent breaks to allow movement, using visual aids and objects in the lesson, using role play, and having field trips.

By using a variety of teaching methods from each of these categories, teachers are able to accommodate different learning styles. They are also able to challenge students to learn in different ways. Just as Kolb suggested that students who use all 4 approaches of his learning cycle learn more effectively, students who are able to learn through a variety of ways are more effective learners.

Research evaluating the high, intermediate, and moderate levels of teacher-centered versus learner-centered learning styles have found the congruent groups have no significant differences in achievement than incongruent groups (Spoon & Schell, 1998). Furthermore, learning style was significantly different on demographic variables, specifically age, suggesting a change in learning style as one gets older and acquires more experience. While significant age differences did occur, as well as no experimental manipulation of classroom assignment, the findings do call into question the aim of congruent teaching-learning styles in the classroom.

www.numerons.in

Cognitive style

Cognitive style or "thinking style" is a term used in cognitive psychology to describe the way individuals think, perceive and remember information. Cognitive style differs from cognitive ability (or level), the latter being measured by aptitude tests or so-called intelligence tests. Controversy exists over the exact meaning of the term cognitive style and also as to whether it is a single or multiple dimension of human personality. However, it remains a key concept in the areas of education and management. If a pupil has a cognitive style that is similar to that of his/her teacher, the chances that the pupil will have a more positive learning experience are improved. Likewise, team members with similar cognitive styles likely feel more positive about their participation with the team. While matching cognitive styles may make participants feel more comfortable when working with one another, this alone cannot guarantee the success of the outcome.

www.numerons.in

Multi-dimensional models and measures

A popular, multi-dimensional instrument for the measure of cognitive style is the Myers-Briggs Type Indicator or MBTI. Riding (1991) developed a two-dimensional cognitive style instrument, his Cognitive Style Analysis (CSA), which is a compiled computer-presented test that measures individuals' position on two orthogonal dimensions – Wholist-Analytic (W-A) and Verbal-Imagery (V-I). The W-A dimension reflects how individuals organise and structure information. Individuals described as Analytics will deconstruct information into its component parts, whereas individuals described as Wholists will retain a global or overall view of information. The V-I dimension describes individuals' mode of information representation in memory during thinking – Verbalisers represent information in words or verbal associations, and Imagers represent information in mental pictures. The CSA test is broken down into three sub-tests, all of which are based on a comparison between response times to different types of stimulus items. Some scholars argue that this instrument, being at least in part reliant on the ability of the respondent to answer at speed, really measures a mix of cognitive style and cognitive ability (Kirton, 2003). This is said to contribute to the unreliability of this instrument.

www.numerons.in

Bipolar, one-dimensional models and measures

The Field dependence-independence model, invented by H. Witkin, identifies an individual's perceptive behaviour while distinguishing object figures from the content field in which they are set. Two similar instruments to do this were produced, the Embedded Figures Test (EFT) and the Group Embedded Figures Test] (GEFT) (1971). In both cases, the content field is a distracting or confusing background. These instruments are designed to distinguish field-independent from field-dependent cognitive types; a rating which is claimed to be value-neutral. Field-independent people tend to be more autonomous when it comes to the development of restructuring skills; that is, those skills required during technical tasks with which the individual is not necessarily familiar. They are, however, less

www.numerons.in

autonomous in the development of interpersonal skills. The EFT and GEFT continue to enjoy support and usage in research and practice. However, they, too, are criticised by scholars as containing an element of ability and so may not measure cognitive style alone.

Hudson (Carey, 1991) identified two cognitive styles: convergent thinkers, good at accumulating material from a variety of sources relevant to a problem's solution, and divergent thinkers who proceed more creatively and subjectively in their approach to problem-solving. Hudson's Converger-diverger construct attempts to measure the processing rather than the acquisition of information by an individual. It aims to differentiate convergent from divergent thinkers; the former being persons who think rationally and logically while the latter tend to be more flexible and to base reasoning more on heuristic evidence.

www.numerons.in

In contrast, cognitive complexity theories as proposed by Beiri (1961), attempt to identify individuals who are more complex in their approach to problem-solving against those who are simpler. The instruments used to measure this concept of "cognitive style" are either Driver's Decision Style Exercise (DDSE) (Carey, 1991) or the Complexity Self-Test Description Instrument, which are somewhat ad hoc and so are little used at present.

Pask (Carey, 1991)extended these notions in a discussion of strategies and styles of learning. In this, he classifies learning strategies as either holist or serialist. When confronted with an unfamiliar type of problem, holists gather information randomly within a framework, while serialists approach problem-solving step-wise, proceeding from the known to the unknown.

www.numerons.in

Ornstein's Hemispherical lateralisation concept (Carey, 1991), commonly called left-brain/right-brain theory, posits that the left hemisphere of the brain controls logical and analytical operations while the right hemisphere controls holistic, intuitive and pictorial activities. Cognitive style is thus claimed to be a single dimension on a scale from extreme left-brain to extreme right-brain types, depending on which associated behaviour dominates in the individual, and by how much.

Taggart's (1988) "Whole-brain human information processing theory" classifies the brain as having six divisions, three per hemisphere, which in a sense is a refined model of the hemispherical lateralisation theory discussed above.

The Allinson]-Hayes (1996) Cognitive Style Index (CSI) has features of Ornstein's left-brain/right-brain theory. The CSI contains 38 items, each rated using a 3-point scale (true; uncertain; false). Some scholars have questioned the CSI's construct validity on the grounds of theoretical and methodological limitations associated with its development. It is also noteworthy that this measure of cognitive style is both gender-sensitive and culture-sensitive. While it is entirely plausible that cognitive style is related to these social factors, it does complicate some educational and management issues. It suggests, for instance, that a given student is best taught by a person of a certain sex or culture; or that only persons of certain cultures can work harmoniously together in teams.

www.numerons.in

Kirton's model of cognitive style

One of the most popular models of cognitive style was devised by Michael Kirton (1976, 2003). His model, called Adaption-Innovation theory, claims that an individual's preferred approach to problem solving, can be placed on a continuum ranging from high adaptation to high innovation. He suggests that some human beings, called adaptors tend to prefer the adaptive approach to problem-solving, while others (innovators), of course, prefer the reverse. Adaptors use what is given to solve problems by time-honoured techniques. Alternatively, innovators look beyond what is given to solve problems with the aid of innovative technologies. Kirton suggests that while adaptors prefer to do well within a given paradigm, innovators would rather do differently, thereby striving to transcend existing paradigms.

www.numerons.in

Kirton also invented an instrument to measure cognitive style (at least in accordance with this model) known as the Kirton Adaption-innovation Inventory (KAI). This requires the respondent to rate themselves against thirty-two personality traits. A drawback of all the other efforts to measure cognitive style discussed above is their failure to separate out cognitive style and cognitive level. As the items on the KAI are expressed in clear and simple language, cognitive level plays no significant role. Scores on the A-I continuum are normally distributed between the extreme cognitive styles of high innovation and high adaptation.

Another important concept associated with A-I theory is that of bridging in teams. Kirton (2003) defines bridging as "reaching out to people in the team and helping them be part of it so that they may contribute even if their contribution is outside the main-stream". Bridging is thus a task and a role, which has to be learnt. It is not a cognitive style. Bridging is also not leading, although the skilled leader may make use of persons they recognise as good bridgers to maintain group cohesion. Group cohesion means, to keep the group aware of the importance of its members working well together. Kirton (2003) suggests that it is easier for a person to learn and assume a bridging role if their cognitive style is an intermediate one. If person B assumes a bridging role which assists persons A and C to work well together in a team, then B's KAI score is recommended to be between those of A and C. Of course, it is only recommended that B's score lies between the scores of A and C, not that B's score lies near the KAI mean. All of A, B and C could be high-scoring innovators or, for that matter, high-scoring adaptors.

www.numerons.in

Cognitive Styles Analysis

Cognitive Styles Analysis (CSA) was developed by Richard J. Riding and is the most frequently used computerized measure of cognitive styles. Although CSA is not well known in North American institutions, it is quite popular among European universities and organizations.

www.numerons.in

A number of different labels have been given to cognitive styles and, according to Riding, many of these are but different conceptions of the same dimensions (Riding & Sadler-Smith

1992). Riding and Cheema (Riding & Cheema 1991) surveyed the various (about 30) labels and, after reviewing the descriptions, correlations, methods of assessment, and effect on behavior, concluded that the styles may be grouped into two principal groups: the Wholist-Analytic and the Verbal-Imagery dimensions. It is argued that these dimensions of cognitive style are very fundamental because they develop early in life and are pervasive given their affect on social behavior, decision making, and learning.

Unlike many other measures of cognitive style inventories, CSA has been under substantial empirical investigation. Three experiments reported by (Rezaei 2005) showed the reliability of CSA to be low. Considering the profound theoretical background of CSA, also regarding unsuccessful earlier attempts to create a more reliable parallel form of it (Paterson 2003) some crucial changes are being made in a revised version to improve the validity and reliability of CSA.

www.numerons.in

Learning sciences

The term Learning Sciences (LS) refers to an interdisciplinary field that works to further scientific understanding of learning as well as to engage in the design and implementation of learning innovations, and improvement of instructional methodologies. Research in the learning sciences traditionally focuses on cognitive-psychological and social-psychological foundations of human learning, as well as on the design of learning environments. Major contributing fields include cognitive science, computer science, educational psychology, and anthropology. Over the past decade, researchers have also expanded their focus to the design of curricula, informal learning environments, instructional methods, and policy innovations.

www.numerons.in

Domain Definition

As an emerging discipline, Learning Sciences is still in the process of defining itself. Accordingly, the identity of the field is multifaceted, and varies from institution to institution. However, the International Society of Learning Sciences (ISLS,) summarizes the field as follows: "Researchers in the interdisciplinary field of learning sciences, born during the 1990's, study learning as it happens in real-world situations and how to better facilitate learning in designed environments – in school, online, in the workplace, at home, and in informal environments. Learning sciences research may be guided by constructivist, social-constructivist, socio-cognitive, and socio-cultural theories of learning." ISLS has a large worldwide membership, is affiliated with two international journals: "Journal of the Learning Sciences", and "International Journal of Computer Supported Collaborative Learning", and sponsors the biennial Computer Supported Collaborative Learning conference and International Conference of the Learning Sciences on alternate years."

www.numerons.in

Although controlled experimental studies and rigorous qualitative research have long been employed in Learning Sciences, LS researchers sometimes utilize Design-Based Research methods. Interventions are conceptualized and then implemented in natural settings in order to test the ecological validity of dominant theory and to develop new theories and

frameworks for conceptualizing learning, instruction, design processes, and educational reform. LS research strives to generate principles of practice beyond the particular features of an educational innovation in order to solve real educational problems, giving LS its interventionist character.

History

Several significant events have contributed to the international development of the learning sciences. Perhaps the earliest history can be traced back to the cognitive revolution.

www.numerons.in

In the United States, an important effort to create a graduate program in the learning sciences took place in 1983 when Jan Hawkins and Roy Pea proposed a joint program between Bank Street College and the New School for Social Research. Called "Psychology, Education, and Technology" (PET), the program had a planning grant supported by the Sloan Foundation. In the end the program would have required new faculty, though, and the institutions involved never established such a program. Roger Schank's arrival at Northwestern University in 1988 helped start the Institute for Learning Sciences. In 1991, Northwestern initiated the first learning sciences doctoral program, designed by and launched by Roy Pea as its first director. The program began accepting students in 1992, and after Pea became dean the program directorship was taken over by Brian Reiser.

The Journal of the Learning Sciences was first published in 1991, with Janet Kolodner as founding editor. Yasmin Kafai and Cindy Hmelo-Silver took over as editors in 2009. The International Journal of Computer-Supported Collaborative Learning was established as a separate journal in 2006, edited by Gerry Stahl and Freiderich Hesse.

www.numerons.in

The first biennial meeting of the International Conference of the Learning Sciences took place at Northwestern University in 1994. The International Society of the Learning Sciences was established in 2002.

What distinguishes the Learning Sciences from other related fields?

By integrating multiple fields, the learning sciences extends beyond other closely related fields in distinguishable ways. For example, the learning sciences extends beyond psychology, in that it also accounts for, as well as contributes to computational, sociological and anthropological approaches to the study of learning. Similarly, the learning sciences draws inspiration from cognitive science, and is regarded as a branch of cognitive science; however, it gives particular attention to improving education through the study, modification, and creation of new technologies and learning environments, and various interacting and emergent factors that potentially influence the learning of humans.

www.numerons.in

Many Learning Sciences researchers employ design-based research methodology. The growing acceptance of design-based research methodology as a means for study is often viewed as a significant factor distinguishing the Learning Sciences from many of the fields that contribute to it. By including design-based research within its methodological toolkit,

learning sciences qualifies as a "design science", with characteristics in common with other design sciences that employ design science (methodology) such as engineering and computer science. Learning sciences also have a degree of overlap with instructional design, although historically the two communities have come about in different ways, as described in a special issue of the journal Educational Technology in 2004.

However, it should be emphasized design-based research research methodology is by no means the only research methodology used in the field. Many other methodologies--including computational modeling, experimental and quasi-experimental research, and non-interventionist ethnographic-style qualitative research methodologies--have long been and continue to be employed in learning sciences.

www.numerons.in

Learning theory (education)

In psychology and education, learning is commonly defined as a process that brings together cognitive, emotional, and environmental influences and experiences for acquiring, enhancing, or making changes in one's knowledge, skills, values, and world views (Illeris, 2004; Ormrod, 1995). Learning as a process focuses on what happens when the learning takes place. Explanations of what happens constitute learning theories. A learning theory is an attempt to describe how people and animals learn, thereby helping us understand the inherently complex process of learning. Learning theories have two chief values according to Hill (2002). One is in providing us with vocabulary and a conceptual framework for interpreting the examples of learning that we observe. The other is in suggesting where to look for solutions to practical problems. The theories do not give us solutions, but they do direct our attention to those variables that are crucial in finding solutions.

www.numerons.in

There are three main categories or philosophical frameworks under which learning theories fall: behaviorism, cognitivism, and constructivism. Behaviorism focuses only on the objectively observable aspects of learning. Cognitive theories look beyond behavior to explain brain-based learning. And constructivism views learning as a process in which the learner actively constructs or builds new ideas or concepts.

Merriam and Caffarella (1991) highlight four approaches or orientations to learning: Behaviouist, Cognitivist, Humanist, and Social/Situational. These approaches involve contrasting ideas as to the purpose and process of learning and education - and the role that educators may take.

Behaviorism

Behaviorism as a theory was primarily developed by B. F. Skinner. It loosely encompasses the work of people like Edward Thorndike, Tolman, Guthrie, and Hull. What characterizes these investigators are their underlying assumptions about the process of learning. In essence, three basic assumptions are held to be true. First, learning is manifested by a change in behavior. Second, the environment shapes behavior. And third, the principles of contiguity (how close in time two events must be for a bond to be formed) and

www.numerons.in

reinforcement (any means of increasing the likelihood that an event will be repeated) are central to explaining the learning process. For behaviorism, learning is the acquisition of new behavior through conditioning.

There are two types of possible conditioning:

1) Classical conditioning, where the behavior becomes a reflex response to stimulus as in the case of Pavlov's Dogs. Pavlov was interested in studying reflexes, when he saw that the dogs drooled without the proper stimulus. Although no food was in sight, their saliva still dribbled. It turned out that the dogs were reacting to lab coats. Every time the dogs were served food, the person who served the food was wearing a lab coat. Therefore, the dogs reacted as if food was on its way whenever they saw a lab coat.In a series of experiments, Pavlov then tried to figure out how these phenomena were linked. For example, he struck a bell when the dogs were fed. If the bell was sounded in close association with their meal, the dogs learned to associate the sound of the bell with food. After a while, at the mere sound of the bell, they responded by drooling.

www.numerons.in

2) Operant conditioning where there is reinforcement of the behavior by a reward or a punishment. The theory of operant conditioning was developed by B.F. Skinner and is known as Radical Behaviorism. The word 'operant' refers to the way in which behavior 'operates on the environment'. Briefly, a behavior may result either in reinforcement, which increases the likelihood of the behavior recurring, or punishment, which decreases the likelihood of the behavior recurring. It is important to note that, a punishment is not considered to be applicable if it does not result in the reduction of the behavior, and so the terms punishment and reinforcement are determined as a result of the actions. Within this framework, behaviorists are particularly interested in measurable changes in behavior.

www.numerons.in

Since behaviorists view the learning process as a change in behavior, educators arrange the environment to elicit desired responses through such devices as behavioral objectives, competency -based education, and skill development and training.

Educational approaches such as applied behavior analysis, curriculum based measurement, and direct instruction have emerged from this model.

Cognitivism

The earliest challenge to the behaviorists came in a publication in 1929 by Bode, a gestalt psychologist . He criticized behaviorists for being too dependent on overt behavior to explain learning. Gestalt psychologists proposed looking at the patterns rather than isolated events. Gestalt views of learning have been incorporated into what have come to be labeled cognitive theories. Two key assumptions underlie this cognitive approach: (1) that the memory system is an active organized processor of information and (2) that prior knowledge plays an important role in learning. Cognitive theories look beyond behavior to explain brain-based learning. Cognitivists consider how human memory works to promote learning. For example, the physiological processes of sorting and encoding information and events into short term memory and long term memory are important to educators working

www.numerons.in

under the cognitive theory . The major difference between gestaltists and behaviorists is the locus of control over the learning activity: the individual learner is more key to gestaltists than the environment that behaviorists emphasize.

Once memory theories like the Atkinson-Shiffrin memory model and Baddeley's working memory model were established as a theoretical framework in cognitive psychology, new cognitive frameworks of learning began to emerge during the 1970s, 80s, and 90s. Today, researchers are concentrating on topics like cognitive load and information processing theory. These theories of learning play a role in influencing instructional design. Aspects of cognitivism can be found in learning how to learn, social role acquisition, intelligence, learning, and memory as related to age.

www.numerons.in

Educators employing a cognitivist approach to learning would view learning as internal mental process (including insight, information processing, memory, perception) where in order to develop learner capacity and skills to improve learning, the educator structures content of learning activities to focus on building intelligence and cognitive and meta-cognitive development.

Constructivism

The learning theories of Jean Piaget, Jerome Bruner, Lev Vygotsky and John Dewey serve as the foundation of constructivist learning theory. Constructivism views learning as a process in which the learner actively constructs or builds new ideas or concepts based upon current and past knowledge or experience. In other words, "learning involves constructing one's own knowledge from one's own experiences." Constructivist learning, therefore, is a very personal endeavor, whereby internalized concepts, rules, and general principles may consequently be applied in a practical real-world context. This is also known as social constructivism (see social constructivism). Social constructivists posit that knowledge is constructed when individuals engage socially in talk and activity about shared problems or tasks. Learning is seen as the process by which individuals are introduced to a culture by more skilled members". Constructivism itself has many variations, such as Active learning, discovery learning, and knowledge building. Regardless of the variety, constructivism promotes a student's free exploration within a given framework or structure. The teacher acts as a facilitator who encourages students to discover principles for themselves and to construct knowledge by working to solve realistic problems. Aspects of constructivism can be found in self-directed learning, transformational learning, experiential learning, situated cognition, and reflective practice and religious practice.

www.numerons.in

Informal and post-modern theories

Informal theories of education breaks down the learning process, learning authentically and with practicality. One theory deals with whether learning should take place as a building of concepts toward an overall idea, or the understanding of the overall idea with the details filled in later. In Marzano’s restructuring knowledge the informal curriculum promotes the use of prior knowledge to help students gain big ideas and concept understanding. This theory states that new knowledge cannot be told to students, rather

student's current knowledge must be challenged. By challenging student's current ideas, students can adjust their ideas to more closely resemble actual theories or concepts. By using this method students gain the big idea taught and later are more willing to learn and keep the specifics of the concept or theory taught. This theory further aligns with the studies of Brown and Ryoo, who support that teaching concepts and the language of a subject should be split into multiple steps.

Other informal learning concerns regard sources of motivation for learning. Deci argues that intrinsic motivation creates a more self-regulated learner yet schools undermine intrinsic motivation. This is not ideal for learning. Critics argue that average students learning in isolation perform significantly lower than those learning with collaboration and mediation. Students learn through talk, discussion, and argumentation.

www.numerons.in

Transformative Learning Theory

Transformative learning theory [explains the] process of constructing and appropriating new and revised interpretations of the meaning of an experience in the world. Transformative learning is the cognitive process of effecting change in a frame of reference although it is recognized that important emotional changes are often involved. These frames of reference define our view of the world and we have a tendency as adults to reject or deem unworthy any ideas that do not ascribe to our particular values, associations, concepts,etc. Our frames of reference are composed of two dimensions: habits of mind and points of view. Habits of mind, such as ethnocentrism, are more fixed and influence our point of view and the resulting thoughts or feelings associated with them, whereas points of view may change over time as a result of influences such as reflection, appropriation and feedback. Transformative learners utilize discourse as a means of critically examination and reflection "devoted to assessing reasons presented in support of competing interpretations, by critically examining evidence, arguments, and alternative points of view." When circumstances permit, transformative learners move toward a frame of reference that is more inclusive, discriminating, self-reflective, and integrative of experience. Transformative learning leads to autonomous and responsible thinking which is essential for full citizenship in democracy and for moral decision making in situations of rapid change.

www.numerons.in

Other learning theories

Educational Neuroscience or Neuroeducation is an emerging new learning theory. Prestigious universities such as Harvard, Johns Hopkins, USC and others are now offering programs dedicated to neuroeducation and are developing majors and degrees in the field. It is founded on connecting what we know about how the brain processes and stores information with classroom instruction and experiences . Neuroeducation analyzed the biological change in the brain as new information is processed and looks at what environmental, emotional, social situations are best in order for the new information to be processed. It further analyzes under what conditions the brain stores information and links it to other neurons versus simply determining that the information is non-essential to store and hence reabsorbs the dendrite and dismisses the information.

www.numerons.in

Radin points out that the examination of the art and science of teaching was further accelerated by President G.H. Bush when he declared the 1990s as the Decade of the Brain. The integration and application of what we know about the brain was strengthened in 2000 when the American Federation of Teachers stated, It is vital that we identify what science tells us about how people learn in order to improve the education curriculum . Rowland discusses that what is exciting about this new field in education is that modern brain imaging techniques now make it possible, in some sense, to watch the brain as it learns. As academic language and learning (ALL) educators often work with students on improving their approaches to learning, the question then arises: can the results of neuro-scientific studies of brains as they are learning usefully inform practice in this area? Although the field of neuroscience is young, it is expected that with new technologies and ways of observing learning, the paradigms of what students need and how students learn best will be further refined with actual scientific evidence. In particular, students who may have learning disabilities will be taught with strategies that engage their brain and makes the connections needed.

www.numerons.in

Other learning theories have also been developed for more specific purposes than general learning theories. For example, andragogy is the art and science to help adults learn.

Connectivism is a recent theory of Networked learning which focuses on learning as making connections.

Multimedia learning theory focuses on principles for the effective use of multimedia in learning.

www.numerons.in

Criticism

Criticism of learning theories that underlie traditional educational practices claims there is no need for such a theory; that the attempt to comprehend the process of learning through theory construction creates more problems and inhibits personal freedom.

Visual learning (Learning Style)

Visual learning is a teaching and learning style in which ideas, concepts, data and other information are associated with images and techniques. It is one of the three basic types of learning styles in the widely-used Fleming VAK/VARK model that also includes kinesthetic learning and auditory learning.

Theory

www.numerons.in

First let us place visual learning in its proper context, learning as a whole. The influential management and systems thinker pioneer Russel Ackoff suggested, the most important contribution of a first rate 21st century education is not content. It is that we acquire the capability to learn and are motivated to do so throughout our lives, we are, by any objective

standard, not doing a very good job. In the developed world today, falling global competitiveness is blamed on education [Karen Ward HSBC:2011], our schools, our universities, our tried and tested auditory sequential systems are broken, no longer fit for purpose, a relic of the 19th century [Ackoff]. It is through this lens that we should judge the early pioneers attempts to use psychology to better our society. The great promise of learning styles, we can prepare our population so they are better able to internalize, reflect, boil down, apply and synthesize information from many, many different sources over extended time frames. As a society, we can do better. We must do better, and we will do better.

www.numerons.in

Although learning styles have "enormous popularity" and both children and adults express personal preferences, there is no evidence that identifying a student's learning style produces better outcomes, and there is significant evidence that the widespread "meshing hypothesis" (that a student will learn best if taught in a method deemed appropriate for the student's learning style) is invalid. Well-designed studies "flatly contradict the popular meshing hypothesis".

The studies flat contradiction fails by confusing practice and theory; for deep background see [Linda Silverman, Thomas G West, Stephen Heppel]. The popular meshing hypothesis as implemented by the study designers is much too simplistic in both application and conception. If learning styles are to become a true science of attention proper screening has to be introduced, differentiated materials need to be prepared and communicated in multiple mediums so the learning channels need to overlapped in the correct order. In short a scientific approach.

www.numerons.in

Visual learning techniques

Creating graphic organizers - Students create graphic organizers such as diagrams, webs, and concept maps by selecting symbols to represent ideas and information. To show the relationships between ideas, students link the symbols and add words to further clarify meaning.

By representing information spatially and with images, students are able to focus on meaning, reorganize and group similar ideas easily, make better use of their visual memory.

In a study entitled Graphic Organizers: A Review of Scientifically Based Research, The Institute for the Advancement of Research in Education at AEL evaluated 29 studies and concluded that visual learning improves student performance in the following areas:

www.numerons.in

Critical Thinking--Graphic organizers link verbal and visual information to help students make connections, understand relationships and recall related details.

Retention

According to research, students better remember information when it's represented and learned both visually and verbally.

Comprehension

Students better comprehend new ideas when they are connected to prior knowledge.

Organization

Students can use diagrams to display large amounts of information in ways that are easy to understand and help reveal relationships and patterns.

www.numerons.in

Visualising data - When working with data, students build data literacy as they collect and explore information in a dynamic inquiry process, using tables and plots to visually investigate, manipulate and analyze data. As students explore the way data moves through various plot types, such as Venn, stack, pie and axis, they formulate questions and discover meaning from the visual representation.

Tips For Students Who Are Visual Learners

The following are some suggested techniques for students who are visual learners, which can be used to make learning and education more effective.

Study Habits

- Understand the big picture, and have it in front of you as you examine smaller details.
- When trying to learn or memorize a piece of information, close your eyes and try to visualize it. If using flashcards, limit the information on each card so it can be easily recalled in your mind.
- Try to find alternate materials to study from; videos, PowerPoint presentations, maps, etc.

www.numerons.in

Learning During Lectures

- Avoid visual distractions. Looking out the window or at the person in front of you will not help you learn the material.
- Make illustrations as you take notes. Draw pictures to help you visualize information. Graphs, maps, and images are helpful in retaining information.
- After class, review and organize your notes. This will help you to sort out the information in a way that is meaningful to you and further solidify the material.

Learning From Textbooks

www.numerons.in

- Preview the chapter by looking through titles, graphs, charts and other visual aids. This will help you obtain the 'big picture' of what you will be learning.
- Use highlighters to emphasize pieces of the material that are especially important. Color-coding is often useful as well.
- Take notes or make illustrations in the margins, or, if it is a textbook you shouldn't be writing in, put them in a separate notebook.

Test Taking

- Think of visual cues used in learning to recall the information for a test. One way to do this is to sit in the same place every time you are in class, then make sure to get the same seat on test day. The visual cues your mind picks up while learning can help you recall information when they are seen again.
- If you find that timed tests are difficult for you or that you feel anxiety when taking tests with a time limit, discuss it with your instructor. Teachers give tests to gather an accurate assessment of the students' progress.

www.numerons.in

Teaching Visual Learners/ Instructor Course Design

There are some elements of design that can be incorporated into any course that will help ensure learning success:

Simplicity

Distance Education course creators sometimes become victims of the "more is better" concept. This is not the best case when developing a course site. Including everything you have or can find on a topic can overwhelm and confuse students. Improper use of fonts, colors, and graphics can also serve as a distraction and hamper the effectiveness of your course. Another common problem in Blackboard courses is the use of too many buttons or links on the course menu. Keeping the content, menu, color and font variations to a minimum can help keep your site design simple.

www.numerons.in

Consistency

Consistency can greatly reduce the time initially required to navigate your course site. Consistency across pages can reduce the load on cognitive processing and prevent cognitive overload. If learning to use a course is a quick and painless process, learners are motivated to continue. Consistencies should include: colors, backgrounds, fonts, headings, text layout, folder management, and placement of course materials.

Some inconsistencies, if used correctly and infrequently, such as changing text formats can quickly grab a learner's attention. These might include a highlighted line of text, or an altered color scheme to indicate a change of topic.

Personalizing

www.numerons.in

Personalizing your course site is also important in order to establish instructor presence, which has been shown to increase student engagement. Some ideas to accomplish this include:

- Add a course banner
- Add a personal picture within "Staff (Faculty) Information"

- Add personal audio clips conveying reinforcement.

Also remember to set proper "availabilities" within your Blackboard's control panel. These course options allow you to customize your course by making only the features you will use "available" to students.

Improvements can be made to enhance the "user friendliness" of your course by creating and managing folders. It's best if folders are arranged and labeled in a logical and consistent sequence. Some common "labels" used for folders - Module - Unit - Week (and number) - Topic - Lesson. Consistency in folder management, labeling and corresponding discussion forums will help students easily navigate throughout your course without aggravation.

www.numerons.in

Design goals

Remember to keep the following goals in as you create course content.

Design your content:

- to focus attention
- to avoid visual fatigue and cognitive overload
- for scanning
- to educate and not to impress
- for various learning styles
- for consistency

www.numerons.in

Auditory learning (Learning Style)

Auditory learning is a learning style in which a person learns through listening. An auditory learner depends on hearing and speaking as a main way of learning. Auditory learners must be able to hear what is being said in order to understand and may have difficulty with instructions that are written. They also use their listening and repeating skills to sort through the information that is sent to them.

The Fleming VAK/VARK model, one of the most common and widely used categorizations of the various types of learning styles, categorized the various types of learning styles as follows: visual learners, auditory learners, reading/writing-preference learners, and kinesthetic learners (also known as "tactile learners").

Characteristics

www.numerons.in

They may struggle to understand a chapter they've read, but then experience a full understanding as they listen to the class lecture.

Auditory learners may have a knack for ascertaining the true meaning of someone's words by listening to audible signals like changes in tone. When memorizing a phone number, an auditory learner will say it out loud and then remember how it sounded to recall it.

Auditory learners are good at writing responses to lectures they've heard. They're also good at oral exams, effectively by listening to information delivered orally, in lectures, speeches, and oral sessions.

www.numerons.in

Proponents claim that when an auditory/verbal learner reads, it is almost impossible for the learner to comprehend anything without sound in the background. In these situations, listening to music or having different sounds in the background (TV, people talking, etc.) will help learners work better.

Auditory learners are good at storytelling. They solve problems by talking them through. Speech patterns include phrases "I hear you; That clicks; It's ringing a bell", and other sound or voice-oriented information. These learners will move their lips or talk to themselves to help accomplish tasks.

Recommended techniques

Proponents say that teachers should use these techniques to instruct auditory learners: verbal direction, group discussions, verbal reinforcement, group activities, reading aloud, and putting information into a rhythmic pattern such as a rap, poem, or song.

Proponents recommend techniques like these to auditory learners:

www.numerons.in

- Record class notes and then listen to the recording, rather than reading notes.
- Remember details by trying to "hear" previous discussions.
- Participate in class discussions.
- Ask questions and volunteer in class.
- Read assignments out loud.
- Whisper new information when alone.

An auditory learner may benefit by using the speech recognition tool available on many PCs.

Prevalence

Auditory learners make up about 20% of the population.

Lack of evidence

www.numerons.in

Although learning styles have "enormous popularity", and both children and adults express personal preferences, there is no evidence that identifying a student's learning style produces better outcomes, and there is significant evidence that the widely touted "meshing hypothesis" (that a student will learn best if taught in a method deemed appropriate for the student's learning style) is invalid. Well-designed studies "flatly

contradict the popular meshing hypothesis". Rather than targeting instruction to the "right" learning style, students appear to benefit most from mixed modality presentations, for instance using both auditory and visual techniques for all students.

Kinesthetic learning (Learning Style)

Kinaesthetic learning is a learning style in which learning takes place by the student actually carrying out a physical activity, rather than listening to a lecture or merely watching a demonstration. It is also referred to as tactile learning. People with a kinesthetic learning style are also commonly known as do-ers.

www.numerons.in

The Fleming VAK/VARK model, one of the most common and widely used categorizations of the various types of learning styles, categorized the various types of learning styles as follows: visual learners, auditory learners, reading/writing-preference learners, and kinesthetic learners (also known as "tactile learners").

Characteristics

According to proponents of the learning styles theory, students who have a predominantly kinesthetic learning style are thought to be natural discovery learners: they have realizations through doing, as opposed to having thought first before initiating action. They may struggle to learn by reading or listening.

www.numerons.in

When revising it helps for the student to move around as this increases the students understanding with learners generally getting better marks in exams when they use that style. The kinesthetic learner usually does well in things such as chemistry experiments, sporting activities, art and acting. They also may listen to music while learning or studying. It is common for kinesthetic learners to focus on two different things at the same time. They will remember things by going back in their minds to what their body was doing. They also have very high hand-eye coordination and very quick receptors.

Kinesthetic learning is a learning style in which learning takes place by the learner using their body in order to express a thought, an idea or an understanding of a particular concept (which could be related to any field).

People with dominant kinesthetic and tactile learning style are commonly known as do-ers. In an elementary classroom setting, these students may stand out because of their constant need to move; high levels of energy which may cause them to be agitated, restless and/or impatient. Kinesthetic learners' short- and long-term memory is strengthened by their use of their own body's movements.

www.numerons.in

Classification

Rita Dunn says that kinesthetic learning and tactile learning are the same learning style.

Galeet BenZion says that kinesthetic and tactile learning are separate learning styles with different characteristics. Specifically, she defined kinesthetic learning as the process that results in new knowledge or understanding given the involvement of the learner's own body movement. This movement is created for the purpose of establishing new or extending existing knowledge. Kinesthetic learning at its best, BenZion found, is established when the learner uses language (their own words) in order to define, explain, resolve and sort-out the way in which his or her own body's movement reflect the concept explored. An example would be a student using movement to find out the sum of 1/2 plus 3/4 via movement, then explain how the motions in space reflect the mathematical process leading to the correct answer.

www.numerons.in

Prevalence

Kinesthetic learners make up about 5% of the population. Many people mistake themselves for kinesthetic/tactile learners because they have not used the full variety of learning options, which means they cannot find the right learning state for them.

Lack of evidence

Although the concept of learning styles enjoys great popularity among educators in some countries, and both children and adults express preferences for particular modes of learning, there is no evidence that identifying a student's learning style produces better outcomes, and there is substantial evidence that the widespread "meshing hypothesis" (that a student will learn best if taught in a method deemed appropriate for the student's learning style) is invalid. Well-designed studies "flatly contradict the popular meshing hypothesis".

www.numerons.in

Proponents say that the evidence related to kinaesthetic learners benefiting from specialized instruction or targeted materials appears mixed at best, because the diagnosis of kinaesthetic and tactile learning is coupled together, rather than in isolation, and because teachers are likely to misdiagnose students' learning styles.

Some studies also show that mixed modality presentations, for instance using both auditory and visual techniques, improve results for subjects across the board. Instruction that stimulates more than the auditory learning style, namely the kinaesthetic learning style is more likely to enhance the learning of a heterogeneous student population.

History

Kinaesthetic intelligence was originally coupled along with tactile abilities and was defined and discussed in Howard Gardner's Frames Of Mind: The Theory of Multiple Intelligences. In it, Gardner describes activities such as dancing and conducting surgery as ones that would require an advanced kinaesthetic intelligence, i.e., the use of the body to generally create something new or do something.

www.numerons.in

Margaret H'Doubler wrote and spoke about kinaesthetic learning in the 1940s. She defined kinaesthetic learning as the human's body's ability to express itself through movement and dance.

Learning Methods

Cooperative learning

www.numerons.in

Cooperative learning is an approach to organizing classroom activities into academic and social learning experiences. Students must work in groups to complete tasks collectively. Unlike individual learning, students learning cooperatively capitalize on one another's resources and skills (asking one another for information, evaluating one another's ideas, monitoring one another's work, etc.). Furthermore, the teacher's role changes from giving information to facilitating students' learning. Everyone succeeds when the group succeeds.

History

Prior to World War II, social theorists such as Allport, Watson, Shaw, and Mead began establishing cooperative learning theory after finding that group work was more effective and efficient in quantity, quality, and overall productivity when compared to working alone. However, it wasn't until 1937 when researchers May and Doob found that people who cooperate and work together to achieve shared goals, were more successful in attaining outcomes, than those who strived independently to complete the same goals. Furthermore, they found that independent achievers had a greater likelihood of displaying competitive behaviours. Philosophers and psychologists in the 1930s and 40's such as John Dewey, Kurt Lewin, and Morton Deutsh also influenced the cooperative learning theory practiced today. Dewey believed it was important that students develop knowledge and social skills that could be used outside of the classroom, and in the democratic society. This theory portrayed students as active recipients of knowledge by discussing information and answers in groups, engaging in the learning process together rather than being passive receivers of information (e.g. teacher talking, students listening). Lewin's contributions to cooperative learning were based on the ideas of establishing relationships between group members in order to successfully carry out and achieve the learning goal. Deutsh's contribution to cooperative learning was positive social interdependence, the idea that the student is responsible for contributing to group knowledge. Since then, David and Roger Johnson have been actively contributing to the cooperative learning theory. In 1975, they identified that cooperative learning promoted mutual liking, better communication, high acceptance and support, as well as demonstrated an increase in a variety of thinking strategies among individuals in the group. Students who showed to be more competitive lacked in their interaction and trust with others, as well as in their emotional involvement with other students. In 1994 Johnson and Johnson published the 5 elements (positive interdependence, individual accountability, face-to-face interaction, social skills, and processing) essential for effective group learning, achievement, and higher-order social, personal and cognitive skills (e.g., problem solving, reasoning, decision-making, planning, organizing, and reflecting).

www.numerons.in

www.numerons.in

Types

Formal cooperative learning is structured, facilitated, and monitored by the educator over time and is used to achieve group goals in task work (e.g. completing a unit). Any course material or assignment can be adapted to this type of learning, and groups can vary from 2-6 people with discussions lasting from a few minutes up to a period. Types of formal cooperative learning strategies include jigsaw, assignments that involve group problem solving and decision making, laboratory or experiment assignments, and peer review work (e.g. editing writing assignments). Having experience and developing skill with this type of learning often facilitates informal and base learning.

www.numerons.in

Informal cooperative learning incorporates group learning with passive teaching by drawing attention to material through small groups throughout the lesson or by discussion at the end of a lesson, and typically involves groups of two (e.g. turn-to-your-partner discussions). These groups are often temporary and can change from lesson to lesson (very much unlike formal learning where 2 students may be lab partners throughout the entire semester contributing to one another's knowledge of science). Discussions typically have four components that include formulating a response to questions asked by the educator, sharing responses to the questions asked with a partner, listening to a partner's responses to the same question, and creating a new well-developed answer. This type of learning enables the student to process, consolidate, and retain more information learned.

In group-based cooperative learning, these peer groups gather together over the long term (e.g. over the course of a year, or several years such as in high school or post-secondary studies) to develop and contribute to one another's knowledge mastery on a topic by regularly discussing material, encouraging one another, and supporting the academic and personal success of group members. Base group learning is effective for learning complex subject matter over the course or semester and establishes caring, supportive peer relationships, which in turn motivates and strengthens the student's commitment to the group's education while increasing self-esteem and self worth. Base group approaches also make the students accountable to educating their peer group in the event that a member was absent for a lesson. This is effective both for individual learning, as well as social support.

Elements

Brown & Ciuffetelli Parker (2009) discuss the 5 basic and essential elements to cooperative learning:

1. Positive Interdependence

www.numerons.in

- Students must fully participate and put forth effort within their group
- Each group member has a task/role/responsibility therefore must believe that they are responsible for their learning and that of their group

2. Face-to-Face Promotive Interaction

- Member promote each others success
- Students explain to one another what they have or are learning and assist one another with understanding and completion of assignments

www.numerons.in

3. Individual Accountability

- Each student must demonstrate master of the content being studied
- Each student is accountable for their learning and work, therefore eliminating "social loafing"

4. Social Skills

- Social skills that must be taught in order for successful cooperative learning to occur
- Skills include effective communication, interpersonal and group skills

i. Leadership

ii. Decision-making

www.numerons.in

iii. Trust-building

iv. Communication

v. Conflict-management skills

5. Group Processing

Every so often groups must assess their effectiveness and decide how it can be improved

In order for student achievement to improve considerably, two characteristics must be present a) Students are working towards a group goal or recognition and b) success is reliant on each individual's learning

a. When designing cooperative learning tasks and reward structures, individual responsibility and accountability must be identified. Individuals must know exactly what their responsibilities are and that they are accountable to the group in order to reach their goal.

www.numerons.in

b. Positive Interdependence among students in the task. All group members must be involved in order for the group to complete the task. In order for this to occur each

member must have a task that they are responsible for which cannot be completed by any other group member.

Research supporting cooperative learning

Research on cooperative learning demonstrated "overwhelmingly positive" results and confirmed that cooperative modes are cross-curricular. Cooperative learning requires students to engage in group activities that increase learning and adds other important dimensions. The positive outcomes include: academic gains, improved race relations and increased personal and social development. Brady & Tsay (2010) report that students who fully participated in group activities, exhibited collaborative behaviours, provided constructive feedback and cooperated with their group had a higher likelihood of receiving higher test scores and course grades at the end of the semester. Results from Brady & Tsay's (2010) study support the notion that cooperative learning is an active pedagogy that fosters higher academic achievement (p. 85).

www.numerons.in

Slavin states the following regarding research on cooperative learning which corresponds with Brady & Tsay's (2010) findings.

- Students demonstrate academic achievement
- Cooperative learning methods are usually equally effective for all ability levels.
- Cooperative learning is affective for all ethnic groups
- Student perceptions of one another are enhanced when given the opportunity to work with one another
- Cooperative learning increases self esteem and self concept
- Ethnic and physically/mentally handicapped barriers are broken down allowing for positive interactions and friendships to occur

www.numerons.in

Limitations

Cooperative Learning has many limitations that could cause the process to be more complicated then first perceived. Sharan (2010) discusses the issue regarding the constant evolution of cooperative learning is discussed as a threat. Due to the fact that cooperative learning is constantly changing, there is the possibility that teachers may become confused and lack complete understanding of the method. Teachers implementing cooperative learning may also be challenged with resistance and hostility from students who believe that they are being held back by their slower teammates or by students who are less confident and feel that they are being ignored or demeaned by their team.

Collaborative learning

www.numerons.in

Collaborative learning is a situation in which two or more people learn or attempt to learn something together. Unlike individual learning, people engaged in collaborative learning capitalize on one another's resources and skills (asking one another for information, evaluating one another's ideas, monitoring one another's work, etc.). More specifically,

collaborative learning is based on the model that knowledge can be created within a population where members actively interact by sharing experiences and take on asymmetry roles. Put differently, collaborative learning refers to methodologies and environments in which learners engage in a common task where each individual depends on and is accountable to each other. These include both face-to-face conversations and computer discussions (online forums, chat rooms, etc.). Methods for examining collaborative learning processes include conversation analysis and statistical discourse analysis.

www.numerons.in

Collaborative learning is heavily rooted in Vygotsky's views that there exists an inherent social nature of learning which is shown through his theory of zone of proximal development. Often, collaborative learning is used as an umbrella term for a variety of approaches in education that involve joint intellectual effort by students or students and teachers. Thus, collaborative learning is commonly illustrated when groups of students work together to search for understanding, meaning, or solutions or to create an artifact or product of their learning. Further, collaborative learning redefines traditional student-teacher relationship in the classroom which results in controversy over whether this paradigm is more beneficial than harmful. Collaborative learning activities can include collaborative writing, group projects, joint problem solving, debates, study teams,and other activities. The approach is closely related to cooperative learning.

Examples of Collaborative Learning

Collaborative Networked Learning is a form of collaborative learning for the self-directed adult learner. Youth directed collaboration, another form of self-directed organizing and learning, relies on a novel, more radical concept of youth voice.

www.numerons.in

Computer-supported collaborative learning (CSCL) is a relatively new educational paradigm within collaborative learning which uses technology in a learning environment to help mediate and support group interactions in a collaborative learning context. CSCL systems use technology to control and monitor interactions, to regulate tasks, rules, and roles, and to mediate the acquisition of new knowledge. Most recently, one study showed that using robots in the classroom to promote collaborative learning led to an increase in learning effectiveness of the activity and an increase in the student's motivation. Researchers and practitioners in several fields, including cognitive sciences, sociology, computer engineering have begun to investigate CSCL, thus, it constitutes a new trans-disciplinary field.

Learning Management Systems is a context that gives collaborative learning particular meaning. In this context, collaborative learning refers to a collection of tools which learners can use to assist, or be assisted by others. Such tools include Virtual Classrooms (i.e. geographically distributed classrooms linked by audio-visual network connections), chat, discussion threads, application sharing (e.g. a colleague projects spreadsheet on another colleague's screen across a network link for the purpose of collaboration), among many others.

www.numerons.in

Collaborative Learning Development Enables developers of learning systems to work as a network. Specifically relevant to e-learning where developers can share and build knowledge into courses in a collaborative environment. Knowledge of a single subject can be pulled together from remote locations using software systems. An example of this could be Content point from Atlantic Link

Collaborative Learning in Virtual Worlds Virtual Worlds by their nature provide an excellent opportunity for collaborative learning. At first learning in virtual worlds was restricted to classroom meetings and lectures, similar to their counterparts in real life. Now collaborative learning is evolving as companies starting to take advantage of unique features offered by virtual world spaces - such as ability to record and map the flow of ideas, use 3D models and virtual worlds mind mapping tools.

www.numerons.in

Collaborative learning in thesis circles in higher education is another example of people learning together. In a thesis circle, a number of students work together with at least one professor or lecturer, to collaboratively coach and supervise individual work on final (e.g. undergraduate or MSc) projects. Students switch frequently between their role as co-supervisor of other students and their own thesis work (incl. receiving feedback from other students).

Collaborative Scripts

Collaborative scripts structure collaborative learning by creating roles and mediating interactions while allowing for flexibility in dialogue and activities. Collaborative scripts are used in nearly all cases of collaborative learning some of which are more suited for face-to-face collaborative learning—usually, more flexible—and others for computer-supported collaborative learning—typically, more constraining. Additionally, there are two broad types of scripts: macro-scripts and micro-scripts. Macro-scripts aim at creating situations within which desired interactions will occur. Micro-scripts emphasize activities of individual learners.

www.numerons.in

Conceptual Components of Scripts

- Objectives: Help participants (i.e. learners and teachers) work together to engage in efficient collaboration processes to reach specific objectives.
- Activities: Identify the activities, and possible constraints, for completing the activities. Activities can include summarizing, questioning, giving an argument, state a claim, etc.
- Sequencing: Explain the expectations of the participants by specifying which activities should be performed and in what order.
- Distribute Roles: Clarify the roles individuals will assume throughout the activity to encourage participants to adopt and consider multiple perspectives.
- Type of Representation: Textual, graphical, or oral representations of explicit instructions are presented to the participants.

www.numerons.in

Problem-based learning

Problem-based learning (PBL) is a student-centered pedagogy in which students learn about a subject in the context of complex, multifaceted, and realistic problems. Working in groups, students identify what they already know, what they need to know, and how and where to access new information that may lead to resolution of the problem. The role of the instructor is that of facilitator of learning who provides appropriate scaffolding of that process by (for example), asking probing questions, providing appropriate resources, and leading class discussions, as well as designing student assessments.

www.numerons.in

PBL was pioneered in the health sciences at McMaster University in the late 1960's and subsequently it has been adopted by other medical school programs (Barrows, 1996) and also been adapted for undergraduate instruction (Boud and Feletti, 1997; Duch et al., 2001; Amador et al., 2006). The use of PBL, like other student-centered pedagogies, has been motivated by recognition of the failures of traditional instruction (Wingspread, 1994; Boyer, 1998) and the emergence of deeper understandings of how people learn (National Research Council, 2000). Unlike traditional instruction, PBL actively engages the student in constructing knowledge in their own mind by themselves, and thus addresses many of deficits of traditional classroom where knowledge is expounded by an instructor.

Characteristics of PBL are:

- Learning is driven by challenging, open-ended, ill-defined and ill-structured problems.
- Students generally work in collaborative groups.
- Teachers take on the role as "facilitators" of learning.

www.numerons.in

In PBL, students are encouraged to take responsibility for their group and organize and direct the learning process with support from a tutor or instructor. Advocates of PBL claim it can be used to enhance content knowledge while simultaneously fostering the development of communication, problem-solving, and self-directed learning skills.

PBL may position students in a simulated real world working and professional context which involves policy, process, and ethical problems that will need to be understood and resolved to some outcome. By working through a combination of learning strategies to discover the nature of a problem, understanding the constraints and options to its resolution, defining the input variables, and understanding the viewpoints involved, students learn to negotiate the complex sociological nature of the problem and how competing resolutions may inform decision-making.

www.numerons.in

Evidence supporting problem-based learning

Hmelo-Silver, Duncan, & Chinn cite several studies supporting the success of the constructivist problem-based and inquiry learning methods. For example, they describe a project called GenScope, an inquiry-based science software application. Students using the

GenScope software showed significant gains over the control groups, with the largest gains shown in students from basic courses.

Hmelo-Silver et al. also cite a large study by Geier on the effectiveness of inquiry-based science for middle school students, as demonstrated by their performance on high-stakes standardized tests. The improvement was 14% for the first cohort of students and 13% for the second cohort. This study also found that inquiry-based teaching methods greatly reduced the achievement gap for African-American students.

www.numerons.in

A systematic review of the effects of problem-based learning in medical school on the performance of doctors after graduation showed clear positive effects on physician competence. This effect was especially strong for social and cognitive competencies such as coping with uncertainty and communication skills.

Examples of applying Problem-Based Learning pedagogy to curriculum

In Malaysia, an attempt is being made to introduce a hybrid of problem-based learning in secondary mathematics called PBL4C, which stands for problem-based learning the four core areas in the mathematics education framework. These core areas are content, thinking processes, skills, & values, with the aim of nurturing wise citizens who are responsible in decision-making for sustainable development. This hybrid first sprouted in SEAMEO RECSAM in 2008 and a paper was presented at the EARCOME5 conference in 2010. At tertiary level, many Malaysian universities are going for PBL purposely to improve the quality of the graduates produced. In collaboration with Aalborg University of Denmark, PBL was introduced at University Tun Hussein Onn Malaysia (UTHM). Since then the PBL was widely used among engineering and as well as humanities lecturers at UTHM (Berhannudin, 2007).

www.numerons.in

Several medical schools have incorporated problem-based learning into their curricula, using real patient cases to teach students how to think like a clinician. More than eighty percent of medical schools in the United States now have some form of problem-based learning in their programs. Research of 10 years of data from the University of Missouri Medical School PBL curriculum supports PBL. (Koh GC-H, Khoo HE, Wong ML, Koh D. The Effects of Problem-based learning during medical school on physician competency: a systematic review. CMAJ 2008;178(1):34-41.)

Maastricht University offers its whole program in PBL format only, as does the University of Limerick Graduate entry medical school in Ireland.

In 2004, the Lake Erie College of Osteopathic Medicine founded a branch campus in Bradenton, Florida, utilizing an entirely PBL format. From 2006-2010, this campus led the nation in COMLEX scores.

www.numerons.in

Constructivism and PBL

From a constructivist perspective Problem-based learning (PBL), the role of the instructor is to guide the learning process rather than provide knowledge (Hmelo-Silver & Barrows, 2006). From this perspective, feedback and reflection on the learning process and group dynamics are essential components of PBL. Students are considered to be active agents who engage in social knowledge construction.

Criticisms of Problem-based learning

www.numerons.in

Problem-based learning and cognitive load

Sweller and others have published a series of studies over the past twenty years that is relevant to problem-based learning but concerning cognitive load and what they describe as the guidance-fading effect (Sweller, 2006). Sweller, et al. conducted several classroom-based studies with students studying algebra problems (Sweller, 1988). These studies have shown that active problem solving early in the learning process, is a less effective instructional strategy than studying worked examples (Sweller and Cooper, 1985; Cooper and Sweller, 1987). Certainly active problem solving is useful as learners become more competent, and better able to deal with their working memory limitations. But early in the learning process, learners may find it difficult to process a large amount of information in a short amount of time. Thus the rigors of active problem solving may become an issue for novices. Once learners gain expertise the scaffolding inherent in problem-based learning helps learners avoid these issues. These studies have however been conducted largely based on individual problem solving of well-defined problems.

www.numerons.in

Sweller (1988) proposed cognitive load theory to explain how novices react to problem solving during the early stages of learning. Sweller, et al. suggests a worked example early, and then a gradual introduction of problems to be solved. They propose other forms of learning early in the learning process (worked example, goal free problems, etc.); to later be replaced by completions problems, with the eventual goal of solving problems on their own (Sweller, Van Merriënboer, & Paas, 1998). This problem based learning becomes very useful later in the learning process.

Many forms of scaffolding have been implemented in problem based learning to reduce the cognitive load of learners. These are most useful to fade guidance during problem solving. As an example, consider the fading effect helps learners to slowly transit from studying examples to solving problems. In this case backwards fading was found to be quite effective.

Cognitive effects of problem-based learning

www.numerons.in

The acquisition and structuring of knowledge in PBL is thought to work through the following cognitive effects (Schmidt, 1993):

- initial analysis of the problem and activation of prior knowledge through small-group discussion
- elaboration on prior knowledge and active processing of new information

- restructuring of knowledge, construction of a semantic network
- social knowledge construction
- learning in contex
- stimulation of curiosity related to presentation of a relevant problem

Other outcomes of problem-based learning

One of the aims of PBL is the development of self-directed learning (SDL) skills. In Loyens, Magda & Rikers' discussion (2008), SDL is defined as "a process in which individuals take the initiative…in diagnosing their learning needs, formulating goals, identifying human and material resources, choosing and implementing appropriate learning strategies, and evaluating learning outcomes." By being invited into the learning process, students are also invited to take responsibility for their learning, which leads to and increase in self-directed learning skills. In Severiens and Schmidt's study of 305 first year college students, they found that PBL and its focus on SDL led to motivation for students to maintain study pace, led to social and academic integration, encouraged development of cognitive skills, and fostered more study progress then students in a conventional learning setting (2009). PBL encourages learners to take a place in the academic world through inquiring and discovery that is central to problem-based learning.

www.numerons.in

Discovery learning

Discovery Learning is a method of inquiry-based instruction and is considered a constructivist based approach to education. It is supported by the work of learning theorists and psychologists Jean Piaget, Jerome Bruner, and Seymour Papert. Although this form of instruction has great popularity, there is some debate in the literature concerning its efficacy (Mayer, 2004).

www.numerons.in

Jerome Bruner is often credited with originating discovery learning in the 1960s, but his ideas are very similar those of earlier writers (e.g. John Dewey). Bruner argues that "Practice in discovering for oneself teaches one to acquire information in a way that makes that information more readily viable in problem solving" (Bruner, 1961, p. 26). This philosophy later became the discovery learning movement of the 1960s. The mantra of this philosophical movement suggests that we should 'learn by doing'. In 1991, The Grauer School, a private secondary school in Encinitas, California, was founded with the motto, "Learn by Discovery ," and integrated a series of world-wide expeditions into their program for high school graduation. (See Expeditionary Learning.)

Discovery learning takes place in problem solving situations where the learner draws on his own experience and prior knowledge and is a method of instruction through which students interact with their environment by exploring and manipulating objects, wrestling with questions and controversies, or performing experiments.

www.numerons.in

Discovery learning in special needs education

With the push for special needs students to take part in the general education curriculum, prominent researchers in the field doubt if general education classes rooted in discovery based learning can provide an adequate learning environment for special needs students. Kauffman has related his concerns over the use of discovery based learning as opposed to direct instruction. Kauffman comments,to be highly successful in learning the facts and skills they need, these facts and skills are taught directly rather than indirectly. That is the teacher is in control of instruction, not the student, and information is given to students (2002).

www.numerons.in

This view is exceptionally strong when focusing on students with math disabilities and math instruction. Fuchs et al. (2008) comment,

Typically developing students profit from the general education mathematics program, which relies, at least in part, on a constructivist, inductive instructional style. Students who accrue serious mathematics deficits, however, fail to profit from those programs in a way that produces understanding of the structure, meaning, and operational requirements of mathematics… Effective intervention for students with a math disability requires an explicit, didactic form of instruction…

Fuchs et al. go on to note that explicit or direct instruction should be followed up with instruction that anticipates misunderstanding and counters it with precise explanations.

It must be noted, however, that few studies focus on the long-term results for direct instruction. Long-term studies may find that direct instruction is not superior to other instructional methods. For instance, a study found that in a group of fourth graders that were instructed for 10 weeks and measured for 17 weeks direct instruction did not lead to any stronger results in the long term than did practice alone (Dean & Kuhn, 2006). Other researchers note that there is promising work being done in the field to incorporate constructivism and cooperative grouping so that curriculum and pedagogy can meet the needs of diverse learners in an inclusion setting (Brantlinger, 1997). However, it is questionable how successful these developed strategies are for student outcomes both initially and in the long term.

www.numerons.in

Criticism of pure discovery learning

A debate in the instructional community now questions the effectiveness of this model of instruction (Kirschner, Sweller, & Clark, 2006). Bruner (1961) suggested that students are more likely to remember concepts if they discover them on their own. This is as opposed to those they are taught directly. However, Kirschner, Sweller, and Clark (2006) report there is little empirical evidence to support discovery learning. Kirschner et al. suggest that fifty years of empirical data does not support those using these unguided methods of instruction.

www.numerons.in

Several groups of educators have found evidence that pure discovery learning is a less effective as an instructional strategy for novices, than more direct forms of instruction (e.g. Tuovinen & Sweller, 1999).

Mayer (2004) points out that interest in discovery learning has waxed and waned since the 1960s. He argues that in each case the empirical literature has shown that the use of pure discovery methods is not suggested, yet time and time again researchers have renamed their instructional methods only to be discredited again, to rename their movement again. Mayer asked the question "Should There Be a Three-Strikes Rule Against Pure Discovery Learning?" While discovery for oneself may be an engaging form of learning, it may also be frustrating.

www.numerons.in

The main idea behind these critiques is that learners need guidance (Kirschner et al., 2006), but later as they gain confidence and become competent then they may learn through discovery.

Inquiry-based learning

Open Learning

An important aspect of inquiry-based science is the use of open learning. Open learning is when there is no prescribed target or result which students have to achieve. In many conventional traditional science experiments, students are told what the outcome of an experiment will be, or is expected to be, and the student is simply expected to 'confirm' this.

In open teaching, on the other hand, the student is either left to discover for themselves what the result of the experiment is, or the teacher guides them to the desired learning goal but without making it explicit what this is. Open teaching is an important but difficult skill for teachers to acquire.

www.numerons.in

Open learning has many benefits. It means students do not simply perform experiments in a routine like fashion, but actually think about the results they collect and what they mean. With traditional non-open lessons there is a tendency for students to say that the experiment 'went wrong' when they collect results contrary to what they are told to expect. In open lessons there are no wrong results, and students have to evaluate the strengths and weaknesses of the results they collect themselves and decide their value. Because the path taken to a desired learning target is uncertain, open lessons are more dynamic and less predictable than traditional lessons.

Open learning has been developed by a number of science educators including the American John Dewey and the German Martin Wagenschein. Wagenschein's ideas particularly complement both open learning and inquiry teaching. He emphasized that students should not be taught bald facts, but should be made to understand and explain what they are learning. His most famous example of this was when he asked physics students to tell him what the speed of a falling object was. Nearly all students would produce an equation. But no students could explain what this equation meant. Wagenschien used this example to show the importance of understanding over knowledge.

www.numerons.in

Inquiry-based learning has been of great influence in science education, where it is known as Inquiry-based science, especially since the publication of the U.S. National Science Educational Standards in 1996. Since this publication some educators have advocated a return to more traditional methods of teaching and assessment. Others feel inquiry is important in teaching students to research and learning (e.g., see Constructivism (learning theory)).

www.numerons.in

Scientists use their background knowledge of principles, concepts and theories, along with the science process skills to construct new explanations to allow them to understand the natural world. This is known as "science inquiry".

The National Science Education Standards call for students to do inquiry, and to know about inquiry. When students do inquiry, they use the same ideas as scientists do when they are conducting research. Students become 'mini-scientists.'

When students are learning about inquiry, they should become familiar with the processes used by scientists, and the new knowledge that results. Inquiry is a natural introduction to the branch of epistemology known as the Nature of Science, which deals with the characteristics of scientific knowledge.

The National Science Education Standards were often misunderstood with regard to inquiry-based learning. As a result, the National Research Council put out a second volume, entitled 'Inquiry and the National Science Education Standards' in 2000. Inquiry-based learning (Enquiry-based learning in British English) or inquiry-based science describes a range of philosophical, curricular and pedagogical approaches to teaching.

www.numerons.in

Inquiry-based learning is an instructional method developed during the discovery learning movement of the 1960s. It was developed in response to a perceived failure of more traditional forms of instruction, where students were required simply to memorize fact laden instructional materials (Bruner, 1961). Inquiry learning is a form of active learning, where progress is assessed by how well students develop experimental and analytical skills rather than how much knowledge they possess.

Inquiry-based learning in science education

Heather Banchi and Randy Bell (2008) suggest that there are four levels of inquiry-based learning in science education: confirmation inquiry, structured inquiry, guided inquiry and open inquiry. With confirmation inquiry, students are provided with the question and procedure (method), and the results are known in advance. Confirmation inquiry is useful when a teacher's goal is to reinforce a previously introduced idea; to introduce students to the experience of conducting investigations; or to have students practice a specific inquiry skill, such as collecting and recording data.

www.numerons.in

In structured inquiry, the question and procedure are still provided by the teacher; however, students generate an explanation supported by the evidence they have collected. In guided inquiry, the teacher provides students with only the research question, and

students design the procedure (method) to test their question and the resulting explanations. Because this kind of inquiry is more involved than structured inquiry, it is most successful when students have had numerous opportunities to learn and practice different ways to plan experiments and record data.

At the fourth and highest level of inquiry, open inquiry, students have the purest opportunities to act like scientists, deriving questions, designing and carrying out investigations, and communicating their results. This level requires the most scientific reasoning and greatest cognitive demand from students.

www.numerons.in

Philosophy

The philosophy of inquiry based learning finds its antecedents in the work of Piaget, Dewey, Vygotsky, and Freire among others.

Characteristics of inquiry-learning

- Inquiry learning emphasizes constructivist ideas of learning. Knowledge is built in a step-wise fashion. Learning proceeds best in group situations.
- The teacher does not begin with a statement, but with a question. Posing questions for students to solve is a more effective method of instruction in many areas. This allows the students to search for information and learn on their own with the teacher's guidance.
- The topic, problem to be studied, and methods used to answer this problem are determined by the student and not the teacher (this is an example of the 3rd level of the Herron Scale)

www.numerons.in

The above comments represent a classroom that is fully committed to inquiry, to the greatest extent possible. However, it is not necessary to take an all-or-nothing approach to inquiry-based teaching methods.

In the 1960s, Schwab called for inquiry to be divided into four distinct levels. This was later formalized by Marshal Herron in 1971, who developed the Herron Scale to evaluate the amount of inquiry within a particular lab exercise. Since then, there have been a number of revisions proposed, but the consensus in the science education community is that there is a spectrum of inquiry-based teaching methods available.

Examples of inquiry-based science

- Students develop a method to find which antacid tablets are the best at neutralizing acids.
- Students learn about inertia and movement by studying what affect rolling of marbles on different surfaces has.
- Students work in groups to build bridges to hold marble weights. By doing so they discover how to build strong bridges.

www.numerons.in

- Inquiry based learning is a way of assuring students become more actively involved in what they are learning, particularly in the content area of Science.
- A special case of inquiry learning is problem-based learning (PBL). Students are assigned to teams and provided with an ill-defined problem. Teams must organize themselves, define objectives, assign responsibilities, conduct research, analyze results, and present conclusions. The problems are purposely "ill-defined," causing team members to work collaboratively to define specific issues, problems, and objectives. Such tasks mimic the problem-solving skills that professionals engage in, whether repairing automobiles, or treating cancer patients. Problem-based learning employs open-ended questions that are not limited to a single correct answer. The questions elicit diverse ideas and opinions and require students to work as a group. Problem-based learning naturally integrates various fields of study as students search beyond the traditional curricular boundaries to develop solutions.
- The Hands-On Universe (HOU) project is an educational program that enables students to investigate the Universe while applying tools and concepts from science, math, and technology. Using the Internet, HOU participants around the world request observations from an automated telescope, download images from a large image archive, and analyze them with the aid of user-friendly image processing software. The HOU pedagogical ressources are typical tools inspired from Inquiry-based science education (IBSE).

www.numerons.in

Debate

" After a half century of advocacy associated with instruction using minimal guidance, there appears no body of research supporting the technique. In so far as there is any evidence from controlled studies, it almost uniformly supports direct, strong instructional guidance rather constructivist-based minimal guidance during the instruction of novice to intermediate learners. Even for students with considerable prior knowledge, strong guidance while learning is most often found to be equally effective as unguided approaches. Not only is unguided instruction normally less effective; there is also evidence that it may have negative results when student acquire misconceptions or incomplete or disorganized knowledge "

www.numerons.in

— Why Minimal Guidance During Instruction Does Not Work: An Analysis of the Failure of Constructivist, Discovery, Problem-Based, Experiential, and Inquiry-Based Teaching by Kirschner, Sweller, Clark

Kirschner, Sweller, and Clark (2006) review the literature and have found that although constructivists often cite each others' work, empirical evidence is not often cited. Nonetheless the constructivist movement gained great momentum in the 1990s, because many educators began to write about this philosophy of learning.

www.numerons.in

Inquiry-based science has been increasingly promoted as a mainstream teaching approach, especially since the publication of the 1996 Standards in Science Education document. However, there are many critics of inquiry-based science.

Science testing has become increasingly important with the No Child Left Behind program, and the rewriting of the National Assessment of Educational Progress to emphasize facts. This has led to a decrease in emphasis on inquiry as a method of teaching science and a fall back to more traditional 'chalk and talk' methods.

Hmelo-Silver, Duncan, & Chinn cite several studies supporting the success of the constructivist problem-based and inquiry learning methods. For example, they describe a project called GenScope, an inquiry-based science software application. Students using the GenScope software showed significant gains over the control groups, with the largest gains shown in students from basic courses.

www.numerons.in

Hmelo-Silver et al. also cite a large study by Geier on the effectiveness of inquiry-based science for middle school students, as demonstrated by their performance on high-stakes standardized tests. The improvement was 14% for the first cohort of students and 13% for the second cohort. This study also found that inquiry-based teaching methods greatly reduced the achievement gap for African-American students.

Based on their 2005 research, the conservative Thomas B. Fordham Institute concluded that while inquiry-based learning is fine to some degree, it has been carried to excess.

Project-based learning

Project-based learning, or PBL, is the use of in-depth and rigorous classroom projects to facilitate learning and assess student competence. Students use technology and inquiry to respond to a complex issue, problem or challenge. PBL focuses on student-centered inquiry and group learning with the teacher acting as a facilitator.

www.numerons.in

Purpose

Project-based learning (PBL): best defined as instruction relating questions and technology relative to the students' everyday lives to classroom projects. Students form their own investigation of their own group which allows students to develop valuable research skills. The students engage in design, problem solving, decision making, and investigative activities. It allows students to work in groups or by themselves and allows them to come up with ideas and realistic solutions or presentations. Students take a problem and apply it to a real life situation with these projects.

Project-based learning (PBL) provides complex tasks based on challenging questions or problems that involve the students' problem solving, decision making, investigative skills, and reflection that include teacher facilitation, but not direction. Project Based Learning is focused on questions that drive students to encounter the central concepts and principles of a subject hands-on.

www.numerons.in

With Project-based learning students learn from these experiences and take them into account and apply them to their lives in the real world. PBL is a different teaching

technique that promotes and practices new learning habits. The students have to think in original ways to come up with the solutions to these real world problems. It helps with their creative thinking skills by showing that there are many ways to solve a problem.

Structure

Project-based learning(PBL): is an approach for classroom activity that emphasizes learning activities that are long-term, interdisciplinary and student-centered. This approach is generally less structured than traditional, teacher-led classroom activities; in a project-based class, students often must organize their own work and manage their own time. Within the project based learning framework students collaborate, working together to make sense of what is going on. Project-based instruction differs from inquiry-based activity by its emphasis on collaborative learning. Additionally, project-based instruction differs from traditional inquiry by its emphasis on students' own artifact construction to represent what is being learned. Students can spend the entire length of the project involved or come in and out as they see fit.

www.numerons.in

Elements

The core idea of project-based learning is that real-world problems capture students' interest and provoke serious thinking as the students acquire and apply new knowledge in a problem-solving context. The teacher plays the role of facilitator, working with students to frame worthwhile questions, structuring meaningful tasks, coaching both knowledge development and social skills, and carefully assessing what students have learned from the experience. Advocates assert that project-based learning helps prepare students for the thinking and collaboration skills required in the workplace.

www.numerons.in

Rigorous and in-depth Project Based Learning:

- is organized around an open-ended Driving Question or Challenge. These focus students' work and deepen their learning by centering on significant issues, debates, questions and/or problems.
- creates a need to know essential content and skills. Typical projects (and most instruction) begin by presenting students with knowledge and concepts and then, once learned, give them the opportunity to apply them. PBL begins with the vision of an end product or presentation which requires learning specific knowledge and concepts, thus creating a context and reason to learn and understand the information and concepts.
- requires inquiry to learn and/or create something new. Not all learning has to be based on inquiry, but some should. And this inquiry should lead students to construct something new – an idea, an interpretation, a new way of displaying what they have learned.
- requires critical thinking, problem solving, collaboration, and various forms of communication. Students need to do much more than remember information—they need to use higher-order thinking skills. They also have to learn to work as a team and contribute to a group effort. They must listen to others and make their own

www.numerons.in

ideas clear when speaking, be able to read a variety of material, write or otherwise express themselves in various modes, and make effective presentations. These skills, competencies and habits of mind are often known as "21st Century Skills". For more info: http://www.bie.org/about/21st_century_skills

- allows some degree of student voice and choice. Students learn to work independently and take responsibility when they are asked to make choices. The opportunity to make choices, and to express their learning in their own voice, also helps to increase students' educational engagement.
- incorporates feedback and revision. Students use peer critique to improve their work to create higher quality products.
- results in a publicly presented product or performance. What you know is demonstrated by what you do, and what you do must be open to public scrutiny and critique.

www.numerons.in

Project-based learning creates opportunities for groups of students to investigate meaningful questions that require them to gather information and think critically. Typical projects present a problem to solve (What is the best way to reduce the pollution in the schoolyard pond?); a phenomenon to investigate (Why is best way to stay on a skateboard?).

Activities

When used with 21st century tools/skills , Project Based Learning (PBL) is more than just a web-quest or internet research task. Within this type of project, students are expected to use technology in meaningful ways to help them investigate, collaborate, analyze, synthesize and present their learning. Where technology is infused throughout the project, a more appropriate term for the pedagogy can be referred to as iPBL (copyright 2006, ITJAB), to reflect the emphasis of technological tools/skills AND academic content.

www.numerons.in

The PROMOTE Georgia Project is an excellent example of iPBL. This 2002 Georgia Department of Education initiative was developed by a team of instructional technologists. When used effectively, research has shown PBL, and iPBL, helps teachers create a high-performing classroom in which teachers and students form a powerful learning community. The aim is for real-life context and technology to meet and achieve outcomes in the curriculum through an inquiry based approach. A PBL approach is designed to encourage students to become independent workers, critical thinkers, and lifelong learners. Many teachers and researches involved in PBL believe it makes school more meaningful as it provides in-depth investigations of real-world topics and significant issues worthy of each individual child's attention and investigation.

www.numerons.in

Another example of a successful PBL interdisciplinary school is located in Pomona, California. International Polytechnic High School, commonly abbreviated as I-Poly High School, originated in 1993, is a public college preparatory high school (9-12) located on the California State Polytechnic University, Pomona (Cal Poly Pomona) campus and operated by the Los Angeles County Office of Education in conjunction with the College of Education

and Integrative Studies at the university. I-Poly is also a teacher training site working collaboratively with Cal Poly Pomona. (http://www.lacoe.edu/orgs/1021/index.cfm)

Another example of a different PBL is Muscatine High School, A four-year comprehensive high school located in Muscatine, Iowa. The school and has recently started the G2 (Global Generation Exponential Learning) consists of middle and high school "Schools within Schools", which deliver the four core subject areas. The concept is based loosely on High Tech High's model of education practiced in public charter schools in San Diego. 16 teachers and 9 administrators visited High Tech High in the spring of 2010, worked with High Tech High Staff in Muscatine, and spent days of curriculum development and planning over the summer. Approximately 380 students, representing MCSD demographics, are involved with the inquiry-based approach at the middle and high school levels. At the high school, activities may include making water purification systems, investigating service learning, or creating new bus routes. At the middle school level, activities may include researching trash statistics, documenting Muscatine history through interviews, or writing essays related to a community scavenger hunt. Classes are designed with an emphasis of assisting a group of diverse students to become college and career ready as they graduate from high school. Design principles that form the foundation of G2 include Personalization, Adult World Connection, College/Career Ready, and Teacher as Designer.

High Tech High in San Diego is yet another example of successful project-based learning with a 21st Century flair (iPBL), as presented in this Jim Lehrer News Hour video.

Within the last several years, a handful proven models organized by PBL educators have received funding from the Bill and Melinda Gates Foundation to start holistic PBL schools across the United States. A few of those organizations include:

- EdVisions Schools
- Envision Schools
- North Bay Academy of Communication and Design
- Big Picture Schools

Roles

PBL relies on learning groups. Student groups determine their projects, in so doing, they engage student voice by encouraging students to take full responsibility for their learning. This is what makes PBL constructivist. Students work together to accomplish specific goals.

When students use technology as a tool to communicate with others, they take on an active role vs. a passive role of transmitting the information by a teacher, a book, or broadcast. The student is constantly making choices on how to obtain, display, or manipulate information. Technology makes it possible for students to think actively about the choices they make and execute. Every student has the opportunity to get involved either individually or as a group.

www.numerons.in

Instructor role in Project Based Learning is that of a facilitator. They do not relinquish control of the classroom or student learning but rather develop an atmosphere of shared responsibility. The Instructor must structure the proposed question/issue so as to direct the student's learning toward content-based materials. The instructor must regulate student success with intermittent, transitional goals to ensure student projects remain focused and students have a deep understanding of the concepts being investigated. It is important for teachers not to provide the students any answers because it defeats the learning and investigating process. Once the project is finished, the instructor provides the students with feedback that will help them strengthen their skills for their next project

www.numerons.in

Student role is to ask questions, build knowledge, and determine a real-world solution to the issue/question presented. Students must collaborate expanding their active listening skills and requiring them to engage in intelligent focused communication. Therefore, allowing them to think rationally on how to solve problems. PBL forces students to take ownership of their success.

Outcomes

More important than learning science, students need to learn to work in a community, thereby taking on social responsibilities. The most significant contributions of PBL have been in schools languishing in poverty stricken areas; when students take responsibility, or ownership, for their learning, their self-esteem soars. It also helps to create better work habits and attitudes toward learning. In standardized tests, languishing schools have been able to raise their testing grades a full level by implementing PBL. Although students do work in groups, they also become more independent because they are receiving little instruction from the teacher. With Project-Based Learning students also learn skills that are essential in higher education. The students learn more than just finding answers, PBL allows them to expand their minds and think beyond what they normally would. Students have to find answers to questions and combine them using critically thinking skills to come up with answers.

www.numerons.in

PBL is significant to the study of (mis-)conceptions; local concepts and childhood intuitions that are hard to replace with conventional classroom lessons. In PBL, project science is the community culture; the student groups themselves resolve their understandings of phenomena with their own knowledge building. Technology allows them to search in more useful ways, along with getting more rapid results.

Opponents of Project Based Learning warn against negative outcomes primarily in projects that become unfocused and tangential arguing that underdeveloped lessons can result in the wasting of precious class time. No one teaching method has been proven more effective than another. Opponents suggest that narratives and presentation of anecdotal evidence included in lecture-style instruction can convey the same knowledge in less class time. Given that disadvantaged students generally have fewer opportunities to learn academic content outside of school, wasted class time due to an unfocused lesson presents a particular problem. Instructors can be deluded into thinking that as long as a student is engaged and doing, they are learning. Ultimately it is cognitive activity that determines the

www.numerons.in

success of a lesson. If the project does not remain on task and content driven the student will not be successful in learning the material. The lesson will be ineffective. Like any approach, Project Based Learning is only beneficial when applied successfully.

Problem-based learning is a similar pedagogic approach, however, problem-based approaches structure students' activities more by asking them to solve specific (open-ended) problems rather than relying on students to come up with their own problems in the course of completing a project.

www.numerons.in

Criticism

One concern is that PBL may be inappropriate in mathematics, the reason being that mathematics is primarily skill-based at the elementary level. Transforming the curriculum into an over-reaching project or series of projects does not allow for the necessary practice at particular mathematical skills. For instance, factoring quadratic equations in elementary algebra is something that requires extensive practice.

Another criticism of PBL is that measures that are stated as reasons for its success are not measurable using standard measurement tools, and rely on subjective rubrics for assessing results.

In PBL there is also a certain tendency for the creation of the final product of the project to become the driving force in classroom activities. When this happens, the project can lose its content focus and be ineffective in helping students learn certain concepts and skills. For example, academic projects that culminate in an artistic display or exhibit may place more emphasis on the artistic processes involved in creating the display than on the academic content that the project is meant to help students learn.

www.numerons.in

What's the Reality?

Although projects are the primary vehicle for instruction in project-based learning, there are no commonly shared criteria for what constitutes an acceptable project. Projects vary greatly in the depth of the questions explored, the clarity of the learning goals, the content and structure of the activity, and guidance from the teacher. The role of projects in the overall curriculum is also open to interpretation. Projects can guide the entire curriculum (more common in charter or other alternative schools) or simply comprise a few scattered hands-on activities. They might be multidisciplinary (more likely in elementary schools) or single-subject (commonly science and math). Some are whole class, others small group, and some individual.

www.numerons.in

Fully realized project-based teaching has never been widespread in mainstream public schooling. Teachers have little training or experience in the approach. Moreover, the time demands of projects, especially in today's context of standards, high-stakes tests, and pacing guides, understandably discourage many teachers from venturing into the kinds of collaborative student investigations that form the foundation of project-based learning.

Project-Based Learning - key features

There are several features that assist to direct the use of project-based instruction within a classroom. It is important to provide students with a specific focus.

What do you expect students to achieve from the project?

It is important that the project has a real world connection. This can be achieved through making several connections to real life experiences or situations that the specific focus age group may be facing. The project needs to allow students to not only make real life connections but also implement decision making skills, interacting with others, learning and applying new concepts and using their knowledge through a variety of education contexts. Working together with others. Collaborating with other students is a key element of Project based learning. As well as teachers and the broader community, however, the focus is on independent learning which help promote higher order thinking skills. It allows students to gain information from a variety of perspectives. Implementing research in a variety of environmental contexts is imperative through the application of several technologies including, computer programs, audio visual equipment and real life research to ensure that the full experience of the project is gained. The ultimate goal is to answer a posed question with the collaboration of others.

www.numerons.in

Computer-supported collaborative learning

Computer-supported collaborative learning (CSCL) is a pedagogical approach wherein learning takes place via social interaction using a computer or through the Internet. This kind of learning is characterized by the sharing and construction of knowledge among participants using technology as their primary means of communication or as a common resource. CSCL can be implemented in online and classroom learning environments and can take place synchronously or asynchronously.

www.numerons.in

The study of computer-supported collaborative learning draws on a number of academic disciplines, including instructional technology, educational psychology, sociology, cognitive psychology, and social psychology. It is related to collaborative learning and computer supported cooperative work (CSCW).

History

Interactive computing technology was primarily conceived by academics, but the use of technology in education has historically been defined by contemporary research trends. The earliest instances of software in instruction drilled students using the behaviorist method that was popular throughout the mid-twentieth century. In the 1970s as cognitivism gained traction with educators, designers began to envision learning technology that employed artificial intelligence models that could adapt to individual learners. Computer-supported collaborative learning emerged as a strategy rich with

www.numerons.in

research implications for the growing philosophies of constructivism and social cognitivism.

Though studies in collaborative learning and technology took place throughout the 1980s and 90s, the earliest public workshop directly addressing CSCL was "Joint Problem Solving and Microcomputers" which took place in San Diego in 1983. Six years later in 1989, the term "computer-supported collaborative learning" was used in a NATO-sponsored workshop in Maratea, Italy. The International Society of the Learning Sciences established a biannual CSCL conference in 1995.

www.numerons.in

The rapid development of social media technologies and the increasing need of individuals to understand and use those technologies has brought researchers from many disciplines to the field of CSCL. CSCL is used today in traditional and online schools and knowledge-building communities such as Wikipedia.

Theories

According to Siemens, “theory serves a dual purpose of explaining phenomena (or more accurately, sense and meaning making) and of providing guidance for decision making or action.” Sutton and Shaw suggest theory is “about the connections among phenomena.” In other words, a theory provides a way for researchers and practitioners to make decisions regarding how a particular research study is constructed and its data interpreted, how its results connect to other research results.

www.numerons.in

The field of CSCL draws heavily from a number of learning theories that emphasize that knowledge is the result of learners interacting with each other, sharing knowledge, and building knowledge as a group. Since the field focuses on collaborative activity and collaborative learning, it inherently takes much from contructivist and social cognitivist learning theories.

Precursor theories

The roots of collaborative epistemology as related to CSCL can be found in Vygotsky’s Social Learning Theory. Of particular importance to CSCL is the theory's notion of internalization or the idea that knowledge is developed by one's interaction with one's surrounding culture and society. The second key element is what Vygotsky called the Zone of proximal development. This refers to a range of tasks the can be too difficult for a learner to master by themselves but is made possible with the assistance of a more skilled individual or teacher. These ideas feed into a notion central to CSCL: knowledge building is achieved through interaction with others.

www.numerons.in

Cooperative learning, though different in some ways from collaborative learning, also contributes to the success of teams in CSCL environments. The five elements for effective cooperative groups identified by the work of Johnson and Johnson are positive interdependence, individual accountability, promotive interaction, social skills, and group

processing. Because of the inherent relationship between cooperation and collaboration, understanding of what encourages successful cooperation is essential to CSCL research.

In the late 1980s and early 1990s, Marlene Scardamalia and Carl Bereiter wrote seminal articles leading to the development of key CSCL concepts: knowledge-building communities and knowledge-building discourse, intentional learning, and expert processes. Their work led to an early collaboration-enabling technology known as Computer Supported Intentional Learning Environment (CSILE).

www.numerons.in

Other learning theories that provide a foundation for CSCL include distributed cognition, problem-based learning, cognitive apprenticeship, and situated learning. Each of these learning theories focuses on the social aspect of learning and knowledge building. Each theory recognizes that learning and knowledge building involve inter-personal activities including conversation, argument, and negotiation.

Collaboration Theory

Only in the last 15 to 20 years have researchers begun to explore the extent to which computer technology could enhance the collaborative learning process. While researchers, in general, have relied on learning theories developed without consideration of computer-support, some have suggested that the field needs to have a theory tailored and refined for the unique challenges that confront those trying to understand the complex interplay of technology and collaborative learning.

www.numerons.in

Collaboration theory, suggested as a system of analysis for CSCL by Gerry Stahl in 2004, postulates that knowledge is constructed in social interactions such as discourse. The theory suggests that learning is not a matter of accepting fixed facts, but is the dynamic, on-going, and evolving result of complex interactions primarily taking place within communities of people. It also emphasizes that collaborative learning is a process of constructing meaning and that meaning creation most often takes place and can be observed at the group unit of analysis. The goal of collaboration theory is to develop an understanding of how meaning is collaboratively constructed, preserved, and re-learned through the media of language and artifacts in group interaction. There are four crucial themes in collaboration theory: collaborative knowledge building, which is seen as a more concrete term than "learning"; group and personal perspectives intertwining to create group understanding; mediation by artifacts (or the use of resources which learners can share or imprint meaning on); and interaction analysis using captured examples that can be analyzed as proof that the knowledge building occurred.

www.numerons.in

Collaboration theory proposes that technology in support of CSCL should provide new types of media that foster the building of collaborative knowing; facilitate the comparison of knowledge built by different types and sizes of groups; and help collaborative groups with the act of negotiating the knowledge they are building. Further, these technologies and designs should strive to remove the teacher as the bottleneck in the communication process. In other words, the teacher should not have to act as the conduit for communication between students or as the avenue by which information is dispensed.

Finally, collaboration theory-influenced technologies will strive to increase the quantity and quality of learning moments via computer-simulated situations.

Strategies

Currently, CSCL is used in instructional plans in classrooms both traditional and online from primary school to post-graduate institutions. Like any other instructional activity, it has its own prescribed practices and strategies which educators are encouraged to employ in order to use it effectively. Because its use is so widespread, there are innumerable scenarios in the use of CSCL, but there are several common strategies that provide a foundation for group cognition.

www.numerons.in

One of the most common approaches to CSCL is collaborative writing. Though the final product can be anything from a research paper, a Wikipedia entry, or a short story, the process of planning and writing together encourages students to express their ideas and develop a group understanding of the subject matter. Tools like blogs, interactive whiteboards, and custom spaces that combine free writing with communication tools can be used to share work, form ideas, and write synchronously.

Technology-mediated discourse refers to debates, discussions, and other social learning techniques involving the examination of a theme using technology. For example, wikis are a way to encourage discussion among learners, but other common tools include mind maps, survey systems, and simple message boards. Like collaborative writing, technology-mediated discourse allows participants that may be separated by time and distance to engage in conversations and build knowledge together.

www.numerons.in

Group exploration refers to the shared discovery of a place, activity, environment or topic among two or more people. Students do their exploring in an online environment, use technology to better understand a physical area, or reflect on their experiences together through the Internet. Virtual worlds like Second Life and Whyville as well as synchronous communication tools like Skype are ideal for this kind of learning.

Problem-based learning is a popular instructional activity that lends itself well to CSCL because of the social implications of problem solving. Complex problems call for rich group interplay that encourages collaboration and creates movement toward a clear goal.

Project-based learning is similar to problem-based learning in that creates impetus to establish team roles and set goals. The need for collaboration is also essential for any project and encourages team members to build experience together. Any file sharing or communication tools can be used to facilitate CSCL in problem- or project-based environments.

www.numerons.in

Teacher Roles

Though the focus in CSCL is on individuals collaborating with their peers, teachers still have a vital role in facilitating learning. Most obviously, the instructor must introduce the

CSCL activity in a thoughtful way that contributes to an overarching design plan for the course. The design should clearly define the learning outcomes and assessments for the activity. In order to assure that learners are aware of these objectives and that they are eventually met, proper administration of both resources and expectations is necessary to avoid learner overload. Once the activity has begun, the teacher is charged with kick-starting and monitoring discussion to facilitate learning. He or she must also be able to mitigate technical issues for the class. Lastly, the instructor must engage in assessment, in whatever form the design calls for, in order to ensure objectives have been met for all students.

www.numerons.in

Without the proper structure, any CSCL strategy can lose its effectiveness. It is the responsibility of the teacher to make students aware of what their goals are, how they should be interacting, potential technological concerns, and the time-frame for the exercise. This framework should enhance the experience for learners by supporting collaboration and creating opportunities for the construction of knowledge. Another important consideration of educators who implement online learning environments is affordance. Students who are already comfortable with online communication often choose to interact casually. Mediators should pay special attention to make students aware of their expectations for formality online. While students sometime have frames of reference for online communication, they often do not have all of the skills necessary to solve problems by themselves. Ideally, teachers provide what is called "scaffolding" or a platform of knowledge that they can build on. A unique benefit of CSCL is that, given proper teacher facilitation, students can use technology to build learning foundations with their peers.This allows instructors to gauge the difficulty of the tasks presented and make informed decisions about the extent of the scaffolding needed.

www.numerons.in

Criticism and concerns

Though CSCL holds promise for enhancing education, it is not without barriers or challenges to successful implementation. Obviously, students or participants need sufficient access to computer technology. Though access to computers has improved in the last 15 to 20 years, teacher attitudes about technology and sufficient access to Internet-connected computers continue to be barriers to more widespread use of CSCL pedagogy.

Furthermore, instructors find that the time needed to monitor student discourse and review, comment on, and grade student products can be more demanding than what is necessary for traditional face-to-face classrooms. The teacher or professor also has an instructional decision to make regarding the complexity of the problem presented. To warrant collaborative work, the problem must be of sufficient complexity, otherwise team work is unnecessary. Also, there is risk in assuming that students instinctively know how to work collaboratively. Though the task may be collaborative by nature, students may still need training on how to work in a truly cooperative process.

www.numerons.in

Others have noted a concern with the concept of scripting as it pertains to CSCL. There is an issue with possibly over-scripting the CSCL experience and in so doing, creating "fake

collaboration." Such over-scripted collaboration may fail to trigger the social, cognitive, and emotional mechanisms that are necessary to true collaborative learning.

There is also the concern that the mere availability of the technology tools can create problems. Instructors may be tempted to apply technology to a learning activity that can very adequately be handled without the intervention or support of computers. In the process of students and teachers learning how to use the "user-friendly" technology, they never get to the act of collaboration. As a result, computers become an obstacle to collaboration rather than a supporter of it.

www.numerons.in

Robert Sternberg

Robert Jeffrey Sternberg (born December 8, 1949), is an American psychologist and psychometrician and Provost at Oklahoma State University. He was formerly the Dean of Arts and Sciences at Tufts University, IBM Professor of Psychology and Education at Yale University and the President of the American Psychological Association. He is a member of the editorial boards of numerous journals, including American Psychologist. Sternberg has a BA from Yale University and a PhD from Stanford University. Gordon Bower was his PhD advisor. He holds ten honorary doctorates from one North American, one South American, and eight European universities, and additionally holds an honorary professorate at the University of Heidelberg in Germany. He is currently also a Distinguished Associate of The Psychometrics Centre at the University of Cambridge.

Research interests

www.numerons.in

Sternberg's main research include the following interests:

- Higher mental functions, including intelligence and creativity
- Styles of thinking
- Cognitive modifiability
- Leadership
- Love and hate
- Love and war

Sternberg has proposed a triarchic theory of intelligence and a triangular theory of love. He is the creator (with Todd Lubart) of the investment theory of creativity, which states that creative people buy low and sell high in the world of ideas, and a propulsion theory of creative contributions, which states that creativity is a form of leadership.

He is spearheading an experimental admissions process at Tufts to quantifiably test the creativity of an applicant.

www.numerons.in

Sternberg has criticized IQ tests, saying they are "convenient partial operationalizations of the construct of intelligence, and nothing more. They do not provide the kind of measurement of intelligence that tape measures provide of height."

In 1995, he was on an American Psychological Association task force writing a consensus statement on the state of intelligence research in response to the claims being advanced amid the Bell Curve controversy, titled "Intelligence: Knowns and Unknowns."

A theory of intelligence

Many descriptions of intelligence focus on mental abilities such as vocabulary, comprehension, memory and problem-solving that can be measured through intelligence tests. This reflects the tendency of psychologists to develop their understanding of intelligence by observing behaviour believed to be associated with intelligence.

www.numerons.in

Sternberg believes that this focus on specific types of measurable mental abilities is too narrow. He believes that studying intelligence in this way leads to an understanding of only one part of intelligence and that this part is only seen in people who are "school smart" or "book smart".

There are, for example, many individuals who score poorly on intelligence tests, but are creative or are "street smart" and therefore have a very good ability to adapt and shape their environment. According to Sternberg (2003), giftedness should be examined in a broader way incorporating other parts of intelligence.

The Triarchic Model

www.numerons.in

Sternberg (2003) categorizes intelligence into three parts, which are central in his theory, the triarchic theory of intelligence:

- Analytical intelligence, the ability to complete academic, problem-solving tasks, such as those used in traditional intelligence tests. These types of tasks usually present well-defined problems that have only a single correct answer.
- Creative or synthetic intelligence, the ability to successfully deal with new and unusual situations by drawing on existing knowledge and skills. Individuals high in creative intelligence may give 'wrong' answers because they see things from a different perspective.
- Practical intelligence, the ability to adapt to everyday life by drawing on existing knowledge and skills. Practical intelligence enables an individual to understand what needs to be done in a specific setting and then do it.

Sternberg (2003) discusses experience and its role in intelligence. Creative or synthetic intelligence helps individuals to transfer information from one problem to another. Sternberg calls the application of ideas from one problem to a new type of problem relative novelty. In contrast to the skills of relative novelty there is relative familiarity which enables an individual to become so familiar with a process that it becomes automatized. This can free up brain resources for coping with new ideas.

www.numerons.in

Context, or how one adapts, selects and shapes their environment is another area that is not represented by traditional measures of giftedness. Practically intelligent people are good at picking up tacit information and utilizing that information. They tend to shape their environment around them. (Sternberg, 2003)

Sternberg (2003) developed a testing instrument to identify people who are gifted in ways that other tests don't identify. The Sternberg Triarchic Abilities Test measures not only traditional intelligence abilities but analytic, synthetic, automazation and practical abilities as well. There are four ways in which this test is different from conventional intelligence tests.

www.numerons.in

- This test is broader, measuring synthetic and practical skills in addition to analytic skills.
- The test provides scores on analytic, synthetic, automatization, and practical abilities, as well as verbal, quantitative, and figural processing abilities.
- The test measures the ability to understand unknown words in context rather than vocabulary skills which are dependent on an individual's background. The automatization subtest is the only part of the test that measures mental speed.
- The test is based on a theory of intelligence.

Practical application

Sternberg added experimental criteria to the application process for undergraduates to Tufts University, where he was Dean of Arts and Sciences, to test "creativity and other non-academic factors." Calling it the "first major university to try such a departure from the norm," Inside Higher Ed noted that Tufts continues to consider the SAT and other traditional criteria.

www.numerons.in

Theory in cognitive styles

Sternberg proposed a theory of cognitive styles in 1997.

Sternberg's basic idea is that the forms of government we have in the world are external reflections of the way different people view and act in the world, that is, different ways of organizing and thinking. Cognitive styles should not be confused with abilities, they are the way we prefer to use these abilities. Indeed a good fit between a person's preferred cognitive profile and his abilities can create a powerful synergy that outweighs the sum of its parts.

The main three branches of government are the executive branch, legislative branch and judicial branch. People also need to perform these functions in their own thinking and working. Legislative people like to build new structures, creating their own rules along the way. Executive people are rule followers, they like to be given a predetermined structure in which to work in. Judicial people like to evaluate rules and procedures, to analyze a given structure.

www.numerons.in

The four forms of mental self-government are hierarchical, monarchic, oligarchic, and anarchic. The hierarchic style holds multiple goals simultaneously and prioritizes them. The oligarchic style is similar but differs in involving difficulty prioritizing. The monarchic style, in comparison, focuses on a single activity until completion. The anarchic style resists conformity to "systems, rules, or particular approaches to problems."

The two levels of mental self-government are local and global. The local style focuses on more specific and concrete problems, in extreme case they "can't see the forest for the trees". The global style, in comparison, focuses on more abstract and global problems, in extreme cases they "can't see the trees for the forest".

The two scopes of mental self-government are internal and external. The internal style focuses inwards and prefers to work independently. The external style focuses outwards and prefers to work in collaboration.

The two leanings of mental self-government are the liberal and conservative. These styles have nothing to do with politics. The liberal individual likes change, to go beyond exciting rules and procedures. The conservative individual dislikes change and ambiguity, he will be happiest in a familiar and predictable environment.

We all have different profiles of thinking styles which can change over situations and time of life. Moreover a person can, and often does, have a secondary preferred thinking style.

www.numerons.in

Learning by teaching

In professional education, learning by teaching designates currently the method by Jean-Pol Martin that allows pupils and students to prepare and to teach lessons, or parts of lessons. Learning by teaching should not be confused with presentations or lectures by students, as students not only convey a certain content, but also choose their own methods and didactic approaches in teaching classmates that subject. Neither should it be confused with tutoring, because the teacher has intensive control of, and gives support for, the learning process in learning by teaching as against other methods.

History

Seneca the Younger told in his letters to Lucilius that we are learning if we teach (epistulae morales I, 7, 8): docendo discimus (lat.: "by teaching we are learning"). At all times in the history of schooling there have been phases where students were mobilized to teach their peers. Frequently, this was to reduce the number of teachers needed, so one teacher could instruct 200 students. However, since the end of the 19th century, a number of didactic-pedagogic reasons for student teaching have been put forward.

www.numerons.in

Students as teachers in order to spare teachers

In 1795 the Scotsman Andrew Bell wrote a book about the mutual teaching method that he observed and used himself in Madras. The Londoner Joseph Lancaster picked up this idea and implemented it in his schools. This method was introduced 1815 in France in the "écoles mutuelles", because of the increasing number of students who had to be trained and the lack of teachers. After the French revolution of 1830, 2,000 "écoles mutuelles" were registered in France. Due to a political change in the French administration, the number of écoles mutuelles shrank rapidly and these schools were marginalized. It is important to stress that the learning level in the Bell-Lancaster-schools was very low. In hindsight, the low level can probably be attributed to the fact that the teaching-process was delegated entirely to the tutors and that the teachers did not supervise and support the teaching process.

www.numerons.in

Students as teachers in order to improve the learning-process

Student teaching vocabulary

The first attempts using the learning by teaching method in order to improve learning were started at the end of the 19th century.

Selective descriptions and researches

www.numerons.in

Systematic research – though initially only descriptive – began in the middle of the 20th century. For instance Gartner 1971 in the US, in Germany Krüger 1975, Wolfgang Steining 1985, Udo Kettwig 1986, Theodor F. Klassen 1988, Ursula Drews 1997 and A. Renkl 1997.

LdL as a comprehensive method

The method received broader recognition starting in the early eighties, when Jean-Pol Martin developed the concept systematically for the teaching of French as a foreign language and gave it a theoretical background in numerous publications. 1987 he founded a network of more than a thousand teachers that employed learning by teaching (the specifical name: LdL = "Lernen durch Lehren") in many different subjects, documented its successes and approaches and presented their findings in various teacher training sessions. From 2001 on LdL has gained more and more supporters as a result of educational reform movements started throughout Germany.

www.numerons.in

Learning by teaching by Martin (LdL)

LdL by Martin consists of two components: a general anthropological one and a subject-related one.

The anthropological basis of LdL is related to the pyramid or hierarchy of needs introduced by Abraham Maslow, which consists, from base to peak, of 1) physiological needs, 2) safety/security, 3) social/love/belonging, 4) esteem/self-confidence and 5) being/growth through self-actualization and self-transcendence. Personal growth moves upward through hierarchy, whereas regressive forces tend to push downward. The act of successful learning, preparation and teaching of others contributes to items 3 through 5 above. Facing the problems of our world today and in the future, it is essential to mobilize as many intellectual resources as possible, which happens in LdL lessons in a special way. Democratic skills are promoted through the communication and socialization necessary for this shared discovery and construction of knowledge.

www.numerons.in

The subject related component (in foreign language teaching) of LdL aims to negate the alleged contradiction between the three main components: automatization of speech-related behavior, teaching of cognitively internalized contents and authentic interaction/communication.

The LdL approach

After intensive preparation by the teacher, students become responsible for their own learning and teaching. The new material is divided into small units and student groups of not more than three people are formed. Each group familiarizes itself with a strictly defined area of new material and gets the assignment to teach the whole group in this area. One important aspect is that LdL should not be confused with a student-as-teacher-centered method. The material should be worked on didactically and methodologically (impulses, social forms, summarizing phases etc.). The teaching students have to make sure their audience has understood their message/topic/grammar points and therefore use different means to do so (e.g. short phases of group or partner exercises, comprehension questions, quizzes etc.). An important effect from LdL is to develop the students' "websensibility," defined as "a cognitive and emotional sensibility for interdependence."

www.numerons.in

Building neural network: websensibility as target

Martin attempted to transfer the brain structure, especially the operating model from neural networks – to classroom interactions. The activities conducted during the various lessons phases and their consequences are summarized in the following table:

Phases	**Students' behavior**	**Teacher's behavior**	**Additional comments**
Preparation at home	The students work intensively at home, because the quality of the classroom discussion (collective intelligence, emergence) depends closely on the students' ("the neurons") preparation. Students who are not prepared or who are often absent are not able to react to impulses or to "fire off" impulses themselves.	The teacher ("the frontal cortex") has to perfectly master the content because he or she must be able to intervene at any time, completing or giving incentives in order to enhance the quality of classroom discussion	Using LdL means that lesson time will not be used in order to communicate new content but instead for interaction either in little groups or with the entire class (collective knowledge constructing). The homework should prepare the students to interact on a high level during the lesson
Interactions during the lesson	The students sit in a circle. Each student listens with concentration to the other students and asks questions if something in the explanations is not clear	The students sit in a circle. Each student listens with concentration to the other students and asks questions if something in the explanations is not clear	Using LdL means that during the presentations and interactions the students have to be absolutely quiet so that everybody is able to listen to the students' utterances. During the students' interactions, the teacher has to back off
Introduction: information gathering two by two: example "Dom Juan by Molière"	Using "human resources": the students in charge of the course briefly present the new topic and let the other students discuss what is new about this topic (for example about Dom Juan by Molière)	The teacher looks to see if the students really exchange their knowledge	Using LdL means that the students' already existing knowledge about the new topic will be "inventoried" in little groups
First deepening: Gathering information in class	The leading students inspire their classmates to interact (they are sitting in circle) as long as all the questions are asked and answered. The students interact like neurons in neural networks and thoughts "emerge".	The teacher makes sure that each student has the opportunity to participate, and asks questions if something is not clear and needs to be clarified by the class (until the "emergence" has reach the desired quality)	The previous knowledge from each student is interchanged within the full-classroom discussion and aligned, since the new content will be fed in.
Introducing the new content in the classroom (example: "Molière's humor in *Dom Juan*")	The teaching students introduce the new content in small portions to their peers (for example, relevant scenes from Dom Juan) and they repeatedly ask questions in order to check if everything is clear	The teacher observes the communication and intervenes if something is not clear. The teacher continues to let the students clarify what they have said if meaning or content are not completely clear	By LdL the new content is shared in small portions and communicated step-by-step in the classroom.
The second deepening: Playing scenes	Led by the teaching students, the relevant scenes will be played and memorized (for example the seduction of the	The teacher gives input of new ideas, and makes sure that there is adequate and successful scene-playing by	In LdL the teacher is a director and is not afraid of interrupting if presentations in front of the

www.numerons.in

	peasant-maid by Don Juan)	the students	other students are not expressive enough (workshop ambiance).
The third deepening: written homework (text task, interpretation of a place, for instance, Don Juan's discussion with his father)	All pupils work hard at home	The teacher collects all homework and carefully corrects it	In teaching younger grades the LdL tasks are prepared during the lessons themselves. For older grades, the preparation shifts more and more towards homework so that a bigger proportion of the teaching time is available for interactions (collective reflection) .

www.numerons.in

Advantages and disadvantages

Most teachers using the method do not apply it in all their classes or all the time. They state the following advantages and disadvantages:

Advantages

- Student work is more motivated, efficient, active and intensive due to lowered inhibitions and an increased sense of purpose
- By eliminating the class division of authoritative teacher and passive audience, an emotive solidarity is obtained.
- Students may perform many routine tasks, otherwise unnecessarily carried out by the instructor
- Next to subject-related knowledge students gain important key qualifications like
  - teamwork
  - planning abilities
  - reliability
  - presentation and moderation skills
  - self-confidence

www.numerons.in

Disadvantages

- The introduction of the method requires a lot of time.
- Students and teachers have to work more than usual.
- There is a danger of simple duplication, repetition or monotony if the teacher does not provide periodic didactic impetus.

www.numerons.in

Reception of Martin's methods

Martin's work has been well received in teacher training and by practicing teachers: since 1985 more than 100 teacher students in all subjects wrote their ending thesis about LdL. Also the education administration received both the theory and the practice of LdL

(vgl.Margret Ruep 1999). In didactics handbooks LdL has been described as an "extreme form of learner centred teaching"). On the university level, LdL has been disseminated by Joachim Grzega in Germany, Guido Oebel in Japan and Alina Rachimova in Russia.

Learning by teaching outside the LdL-context

Sudbury schools

www.numerons.in

Sudbury schools, since 1968, do not segregate students by age, so that students of any age are free to interact with students in other age groups. One effect of this age mixing is that a great deal of the teaching in the school is done by students. Here are some statements about Learning by teaching in the Sudbury Schools:

- "Kids love to learn from other kids. First of all, it's often easier. The child teacher is closer than the adult to the students' difficulties, having gone through them somewhat more recently. The explanations are usually simpler, better. There's less pressure, less judgment. And there's a huge incentive to learn fast and well, to catch up with the mentor.
- Kids also love to teach. It gives them a sense of value, of accomplishment. More important, it helps them get a better handle on the material as they teach; they have to sort it out, get it straight. So they struggle with the material until it's crystal clear in their own heads, until it's clear enough for their pupils to understand."

Pupil-Team Learning: The Durrell Studies

www.numerons.in

In the 1950s Dr. Donald D. Durrell and his colleagues at Boston University pursued similar methods which they named Pupil-Team Learning. A year-long efficacy study in the schools of Dedham, Massachusetts, was published in the Boston University Journal of Education, Vol. 142, December, 1959, entitled "Adapting Instruction to the Learning Needs of Children in the Intermediate Grades" in which one of the authors, Walter J. McHugh, reported significant learning gains from the use of pupil teams.

Peer Learning and Teaching in Higher Education

Teaching and learning within a group or team context can be particularly effective in higher education. This cooperative atmosphere mimics potential workplace scenerios that students would expect to find in there careers after college. The skills learned in this group atmosphere, such as the ability to listen and learn from their peers, is essential in many vocations. Marbach-Ad and Sokolove found that in this peer-to-peer cooperative learning and teaching atmosphere resulted in students questioning and being involved at a higher-level.

www.numerons.in

The Vygotsky Connection

In the 1930s Lev Vygotsky wrote extensively, in Russian, on the profound connection between language and cognition, and in particular oral language (speech) and learning. The

implication of Vygotsky's observations for Learning by Teaching would appear to be direct and apt. "The one who does the talking, does the learning" may best summarize the point: students learn by teaching their peers.

Intellectual giftedness

Intellectual giftedness is an intellectual ability significantly higher than average. It is different from a skill, in that skills are learned or acquired behaviors. Like a talent, intellectual giftedness is usually believed to be an innate, personal aptitude for intellectual activities that cannot be acquired through personal effort.

www.numerons.in

Various ideas about the definition, development, and best ways of identifying intellectual giftedness have been put forward.

Intellectual giftedness may be general or specific. For example, an intellectually gifted person may have a striking talent for mathematics, but not have equally strong language skills.

Intellectual giftedness is not the only form of talent. Howard Gardner's theory of multiple intelligences proposes several kinds of non-intellectual "intelligences", such as bodily-kinesthetic intelligence and interpersonal intelligence. Emotional intelligence is a broad term for one type of non-intellectual intelligence.

When combined with an adequately challenging curriculum and the diligence necessary to acquire and execute many learned skills, intellectual giftedness often produces academic success.

www.numerons.in

There is also artistic or creative giftedness, which may or may not be combined with intellectual giftedness.

Developmental theory

Gifted children may develop asynchronously: their minds are often ahead of their physical growth, and specific cognitive and emotional functions are often developed differently (or to differing extents) at different stages of development. One frequently cited example of asynchronicity in early cognitive development is Albert Einstein, who did not speak until the age of four, but whose later fluency and accomplishments belied this initial delay. Psychologist and cognitive scientist Steven Pinker theorized that, rather than viewing Einstein's (and other famously gifted late-talking individuals) adult accomplishments as existing distinct from, or in spite of, his early language deficits, and rather than viewing Einstein's lingual delay itself as a "disorder", it may be that Einstein's genius and his delay in speaking were developmentally intrinsic to one another.

www.numerons.in

It has been said that gifted children may advance more quickly through stages established by post-Freudian developmentalists such as Jean Piaget. Gifted individuals also experience

the world differently, resulting in certain social and emotional issues. The work of Kazimierz Dabrowski suggests that gifted children have greater psychomotor, sensual, imaginative, intellectual, and emotional "overexcitabilities".

Francoy Gagne's (2000) Differentiated Model of Giftedness and Talent (DMGT) is a developmental theory that distinguishes giftedness from talent, offering explanation on how outstanding natural abilities (gifts) develop into specific expert skills (talents). According to DMGT theory, "one cannot become talented without first being gifted, or almost so". There are six components that can interact in countless and unique ways that fosters the process of moving from having natural abilities (giftedness) to systematically developed skills.

www.numerons.in

These components consist of the gift (G) itself, chance (C), environmental catalyst (EC), intrapersonal catalyst (IC),learning/practice (LP) and the outcome of talent (T). It is important to know that (C), (IC), and (EC) can facilitate but, can also hinder the learning and training of becoming talented. The learning/practice is the moderator. It is through the interactions, both environmental and intrapersonal that influence the process of learning and practice along with/without chance that natural abilities are transformed into talents.

Giftedness from a multiple intelligences perspective

Multiple intelligences has been associated to giftedness or overachievement of some developmental areas (Colangelo, 2003). Multiple intelligences has been described as an attitude towards learning, instead of techniques or strategies (Cason, 2001).

www.numerons.in

There are eight Intelligences, or different areas in which people assimilate or learn about the world around them: interpersonal, intrapersonal, bodily-kinesthetic, linguistic, logical-mathematical, musical, naturalistic, and spatial-visual. If the Theory of Multiple Intelligences is applied to educational curriculum, by providing lesson plans, themes, and programs in a way that all students are encouraged to develop their stronger area, and at the same time educators provide opportunities to enhance the learning process in the less strong areas, academic success may be attainable for all children in a school system.

Gardner proposed in Frames of Mind (Gardner 1983/1994) that intellectual giftedness may be present in areas other than the typical intellectual realm. The concept of multiple intelligences (MI) makes the field aware of additional potential strengths and proposes a variety of curricular methods.

Gardner suggest MI in the following areas: Linguistic, logico-mathematical, musical, spatial, kinesthetic, interpersonal, intrapersonal, naturalistic and existential.

www.numerons.in

Identification of gifted students with MI is a challenge since there is no simple test to give to determine giftedness of MI. Assessing by observation is potentially most accurate, but potentially highly subjective. MI theory can be applied to not only gifted students, but it can be a lens through which all students can be assessed. This more global perspective may

lead to more child-centered instruction and meet the needs of a greater number of children (Colangelo, 2003).

Identifying giftedness

Overview

The formal identification of giftedness first emerged as an important issue for schools, as the instruction of gifted students often presents special challenges. During the 20th century, gifted children were often classified via IQ tests; however, recent developments in theories of intelligence have raised serious questions regarding the appropriate uses and limits of such testing. Many schools in North America and Europe have attempted to identify students who are not challenged by standard school curricula and offer additional or specialized education for them in pursuit of nurturing their talents.

www.numerons.in

Because of the key role that gifted education plays in the identification of gifted individuals, both children and adults, it is worthwhile to examine how that institution uses the term "gifted".

Definitions of giftedness

For many years, psychometricians and psychologists, following in the footsteps of Lewis Terman in 1916, equated giftedness with high IQ. This "legacy" survives to the present day, in that giftedness and high IQ continue to be equated in some conceptions of giftedness. Since that early time, however, other researchers (e.g., Cattell, Guilford, and Thurstone) have argued that intellect cannot be expressed in such a unitary manner, and have suggested more multifaceted approaches to intelligence.

www.numerons.in

Research conducted in the 1980s and 1990s has provided data which support notions of multiple components to intelligence. This is particularly evident in the reexamination of "giftedness" by Sternberg and Davidson in their edited "Conceptions of Giftedness". The many different conceptions of giftedness presented, although distinct, are interrelated in several ways. Most of the investigators define giftedness in terms of multiple qualities, not all of which are intellectual. IQ scores are often viewed as inadequate measures of giftedness. Motivation, high self-concept, and creativity are key qualities in many of these broadened conceptions of giftedness.

Joseph Renzulli's (1978) "three ring" definition of giftedness is one well-researched conceptualization of giftedness. Renzulli's definition, which defines gifted behaviors rather than gifted individuals, is composed of three components as follows: Gifted behavior consists of behaviors that reflect an interaction among three basic clusters of human traits—above average ability, high levels of task commitment, and high levels of creativity. Individuals capable of developing gifted behavior are those possessing or capable of developing this composite set of traits and applying them to any potentially valuable area of human performance. Persons who manifest or are capable of developing an interaction

www.numerons.in

among the three clusters require a wide variety of educational opportunities and services that are not ordinarily provided through regular instructional programs.

In Identifying Gifted Children: A Practical Guide, Susan K. Johnsen explains that gifted children all exhibit the potential for high performance in the areas included in the United States' federal definition of gifted and talented students:

"The term "gifted and talented" when used in respect to students, children, or youth means students, children, or youth who give evidence of high performance capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who require services or activities not ordinarily provided by the school in order to fully develop such capabilities." (P.L. 103–382, Title XIV, p. 388)"

www.numerons.in

This definition has been adopted partially or completely by the majority of the states in the United States. The majority of them have some definition similar to that used in the State of Texas, whose definition states

"[The phrase] "gifted and talented student" means a child or youth who performs at or shows the potential for performing at a remarkably high level of accomplishment when compared to others of the same age, experience, or environment, and who

- exhibits high performance capability in an intellectual, creative, or artistic area;
- possesses an unusual capacity for leadership; or
- excels in a specific academic field." (74th legislature of the State of Texas, Chapter 29, Subchapter D, Section 29.121)"

www.numerons.in

The major characteristics of these definitions are (a) the diversity of areas in which performance may be exhibited (e.g., intellectual, creativity, artistic, leadership, academically), (b) the comparison with other groups (e.g., those in general education classrooms or of the same age, experience, or environment), and (c) the use of terms that imply a need for development of the gift (e.g., capability and potential).

Identification methods

IQ scores can vary for the same person, so a person does not always belong to the same IQ score range each time the person is tested. (IQ score table data and pupil pseudonyms adapted from description of KABC-II norming study cited in Kaufman 2009.)

Pupil	KABC-II	WISC-III	WJ-III
Asher	90	95	111
Brianna	125	110	105
Colin	100	93	101
Danica	116	127	118
Elpha	93	105	93
Fritz	106	105	105

www.numerons.in

Georgi	95	100	90
Hector	112	113	103
Imelda	104	96	97
Jose	101	99	86
Keoku	81	78	75
Leo	116	124	102

Many schools use a variety of assessments of students' capability and potential when identifying gifted children. These may include portfolios of student work, classroom observations, achievement tests, and IQ test scores. Most educational professionals accept that no single criterion can be used in isolation to accurately identify a gifted child.

One of the criteria used in identification may be an IQ test score. Until the late 1960s, when "giftedness" was defined by an IQ score, a school district simply set an arbitrary score (usually in the 130 range) and a student either did or did not "make the cut". It is no longer accepted today in academic circles; however, it's still used by many school districts because it is simple and not entirely without merit. Although a high IQ may have fallen out of favor as a measure to define giftedness, the fact remains that, if a student has a very high IQ, it is significant indicator, indeed the single most important one, of a student's academic potential (Gross, 2004). Correspondingly, if a student scores highly on an IQ test, but performs at an average or below average level academically, this warrants further investigation.

IQ test classifications vary from one publisher to another. IQ tests do not have validity for determining test-takers' rank order at higher IQ levels, and are perhaps only effective at determining whether a student is gifted rather than distinguishing among levels of giftedness. The Wechsler tests have a standard score ceiling of about 160. This has prompted some authors on identification of gifted children to promote the Stanford-Binet form L-M, which has long been obsolete, as the only test with a sufficient ceiling to identify the exceptionally and profoundly gifted, despite the Stanford-Binet L-M never having been normed on a representative national sample. Because the instrument is outdated, current results derived from the Stanford-Binet L-M generate inflated and inaccurate scores.

The IQ assessment of younger children remains debated. Also, those who are more gifted in areas such as the arts and literature tend to do poorly on IQ tests, which are generally verbal- and mathematical-skills related.

While many people believe giftedness is a strictly quantitative difference, measurable by IQ tests, a number of people have described giftedness as a fundamentally different way of perceiving the world, which in turn affects every experience had by the gifted individual. This view is doubted by some scholars who have closely studied gifted children longitudinally.

Savantism

Savants are individuals who perform exceptionally in a single field of learning. More often savant and savantism describes people with a single field of learning well beyond what is considered normal, even among the gifted community. Autistic savantism refers to the exceptional abilities occasionally exhibited by people with autism or other pervasive developmental disorders. The term was introduced in a 1978 article in Psychology Today describing this condition.

Characteristics of giftedness

www.numerons.in

Generally, gifted individuals learn more quickly, deeply, and broadly than their peers. Gifted children may learn to read early and operate at the same level as normal children who are significantly older. The gifted tend to demonstrate high reasoning ability, creativity, curiosity, a large vocabulary, and an excellent memory. They can often master concepts with few repetitions. They may also be physically and emotionally sensitive, perfectionistic, and may frequently question authority. Some have trouble relating to or communicating with their peers because of disparities in vocabulary size (especially in the early years), personality, interests and motivation. As children, they may prefer the company of older children or adults.

Giftedness is frequently not evenly distributed throughout all intellectual spheres; an individual may excel in solving logic problems and yet be a poor speller; another gifted individual may be able to read and write at a far above average level and yet have trouble with mathematics. It is possible there are different types of giftedness with their own unique features, just as there are different types of developmental delay.

www.numerons.in

Giftedness may become noticeable in individuals at different points of development. While early development (i.e. speaking or reading at a very young age) usually comes with giftedness, it is not a determinant of giftedness. The preschool years are when most gifted children begin to show the distinctive characteristics mentioned above. As the child becomes older, classes that are 'too easy' and emotional issues may slow or obstruct the rate of intellectual development.

Many gifted individuals experience various types of heightened awareness and may seem overly sensitive. These sensitivities may be to physical senses such as sight, sound, smell, movement and touch. For example, they may be extremely uncomfortable when they have a wrinkle in their sock, or unable to concentrate because of the sound of a clock ticking on the other side of the room. Sensitivities of the gifted are often to mental and emotional over-awareness. For example, picking up on the feelings of someone close to them, having extreme sensitivity to their own internal emotions, and taking in external information at a significantly higher rate than those around them. These various kinds of sensitivities often mean that the more gifted an individual is, the more input and awareness they experience, leading to the contradiction of them needing more time to process than others who are not gifted.

www.numerons.in

Hypersensitivity to external or internal stimuli can resemble a proneness to "sensory overload", which can cause such persons to avoid highly stimulating, chaotic or crowded

environments. This kind of highly sensitive nature has also been called "overexcitability" by Kazimierz Dabrowski. Some are able to tune out such unwanted stimulation as they focus on their chosen task or on their own thoughts. In many cases, awareness may fluctuate between conditions of hyperstimulation and of withdrawal. (An individual's tendencies to feel overwhelmed is also affected by their extraversion and introversion.)

These conditions may appear to be very similar to symptoms of hyperactivity, bipolar disorder, ADHD, autism-spectrum conditions, and other psychological disorders, but are often explained by gifted education professionals by reference to Kazimierz Dabrowski's theory of Positive Disintegration. Some researchers focus on the study of overexcitabilities. Overexcitabilities refer to ways people, both children and adults, understand and experience the world around them (Gross 2008). The more channels of overexcitabilities that are open to receive the information or stimulus, the stronger or more intense the experience is.

www.numerons.in

According to Gross (2008), an individual response to a stimulus is determined by his/her dominant overexcitability. Overexcitabilities are expressed in five dimensions: psychomotor, sensual, intellectual, imaginational, and emotional. These dominant channels of acquiring information differ by quantity in some individuals.

Minority students who are gifted in America

While white students represent the majority of students enrolled in gifted programs, Black and Hispanic students constitute a percentage less than their enrollment in school. For example, statistics from 1993 indicate that in the U.S., Black students represented 16.2% of public school students, but only constituted 8.4% of students enrolled in gifted education programs. Similarly, while Hispanic students represented 9% of public school students, these students only represented 4.7% of those identified as gifted. However, Asian students make up only 3.6% of the student body, yet constitute 14% in the gifted programs.

www.numerons.in

In their 2004 study, “Addressing the Achievement Gap Between Minority and Nonminority Children by Increasing Access to Gifted Programs” Olszewski-Kubilius et al. write that minority students are “less likely to be nominated by teachers as potential candidates for gifted programs and, if nominated, are less likely to be selected for the program, particularly when such traditional measures as I.Q. and achievement tests are used for identification.”

This underrepresentation of such students gifted programs is attributed to a multiplicity of factors including cultural bias of testing procedures, selective referrals and educator bias, and a reliance on deficit-based paradigms. To address the inequities in assessment procedures, researchers suggest the use of multiple tests and alternative methods of testing, such as performance-based assessment measures (based on Gardner’s theory of multiple intelligences) oral-expressiveness measures as well as non-verbal ability assessments (such as Naglieri Nonverbal Abilities Tests (NNAT) or Raven’s Matrix Analogies Tests.

www.numerons.in

Gifted students of colour experience success when multicultural content is incorporated in the curriculum and furthermore when the curriculum itself is designed to be culturally and linguistically compatible. A culturally diverse curriculum and instruction encourages gifted minority students to experience a sense of belonging and validation as scholars. Furthermore, the educator's role in this process is significant as Lee et al. argue that "[t]eacher awareness and understanding of students' racial and cultural differences and their ability to incorporate multicultural perspectives into curricular content and instructional techniques may counter gifted minority students' discomfort in being one of the few minority students in gifted programs."

www.numerons.in

Twice-exceptional

The term twice exceptional was coined by James J. Gallagher to denote students who are both gifted and have disabilities. People have known about twice exceptional students for thirty years; however, identification and program strategies remain ambiguous. These students need remediation for their learning deficits and enhancement for their strengths to achieve. Twice exceptional students are considered at risk because they are hidden within the general population of their educational environment, and usually viewed as either under-achievers or average learners.

"Early identification and intervention is critical; however, giftedness in the twice-exceptional often is identified later than in the average population and is masked by the disability. The disabilities may include auditory processing weaknesses, sensory motor integration issues, visual perceptual difficulties, spatial disorientation, dyslexia, and attention deficits. Recognition of learning difficulties among the gifted is made extremely difficult by virtue of their ability to compensate. Some guidelines that help in identifying these students are as follows:

www.numerons.in

- Extensive vocabulary
- Difficulty with written expression
- Ability to understand complex ideas
- Easily frustrated
- Wide area of interest
- Highly sensitive
- Creative
- Stubborn and opinionated
- Specific areas of strength
- Highly developed sense of humor
- Curious and inquisitive

Social and emotional issues

www.numerons.in

Isolation

Isolation is one of the main challenges faced by gifted individuals, especially those with no social network of gifted peers. In order to gain popularity, gifted children will often try to

hide their abilities to win social approval. Strategies include underachievement (discussed below) and the use of less sophisticated vocabulary when among same-age peers than when among family members or other trusted individuals.

The isolation experienced by gifted individuals may not be caused by giftedness itself, but by society's response to giftedness. Plucker and Levy have noted that, "in this culture, there appears to be a great pressure for people to be 'normal' with a considerable stigma associated with giftedness or talent." To counteract this problem, gifted education professionals recommend creating a peer group based on common interests and abilities. The earlier this occurs, the more effective it is likely to be in preventing isolation.

www.numerons.in

Perfectionism

Perfectionism is another issue for gifted individuals. It is encouraged by the fact that gifted individuals tend to be easily successful in much of what they do.

Healthy perfectionism refers to having high standards, a desire to achieve, conscientiousness, or high levels of responsibility. It is likely to be a virtue rather than a problem, even if gifted children may have difficulty with healthy perfectionism because they set standards that would be appropriate to their mental age (the level at which they think), but they cannot always meet them because they are bound to a younger body, or the social environment is restrictive. In such cases, outsiders may call some behavior perfectionism, while for the gifted this may be their standard.

www.numerons.in

"Perfectionism becomes desirable when it stimulates the healthy pursuit of excellence."

Unhealthy perfectionism stems from equating one's worth as a human being to one's achievements, and the simultaneous belief that any work less than perfect is unacceptable and will lead to criticism. Because perfection in the majority of human activities is neither desirable, nor possible, this cognitive distortion creates self-doubt, performance anxiety and ultimately procrastination.

The unhealthy perfectionism can be triggered or further exaggerated by parents, siblings, school comrades with good or ill intentions. Parents are usually proud and will praise extensively the gifted child, on the other hand siblings, comrades and school bullies will generally become jealous of the intellectual ease of the gifted child and tease him or her about any minor imperfection in his work, strength, clothes, appearance, or behavior. Either approach—positive reinforcement from parents, or negative reactions from siblings and comrades for minor flaws—will push these kids into considering their worth to their peers as equal to their abilities and consider any imperfection as a serious defect in themselves. The unhealthy perfectionism can be further exaggerated when the child counter-attacks those who mocked him with their own weapons, i.e. their lower abilities, thus creating disdain in himself for low or even average performance.

www.numerons.in

There are many theories that try to explain the correlation between perfectionism and giftedness. Perfectionism becomes a problem as it frustrates and inhibits achievements.

D. E. Hamachek identified six specific, overlapping types of behavior associated with perfectionism. They include:

- Depression
- A nagging "I should" feeling
- Shame and guilt feelings
- Face-saving behavior
- Shyness and procrastination
- Self-deprecation.

www.numerons.in

Underachievement

There is often a stark gap between the abilities of the gifted individual and his or her actual accomplishments. Many gifted students will perform extremely well on standardized or reasoning tests, only to fail a class exam. This disparity can result from various factors, such as loss of interest in too-easy classes or negative social consequences of being perceived as smart. Underachievement can also result from emotional or psychological factors, including depression, anxiety, perfectionism, or self-sabotage.

An often overlooked contributor to underachievement is undiagnosed learning differences. A gifted individual is less likely to be diagnosed with a learning disorder than a non gifted classmate, as the gifted child can more readily compensate for his/her paucities. This masking effect is dealt with by understanding that a difference of one standard deviation between scores constitutes a learning disability even if all of the scores are above average. In addition, many gifted children may underachieve because they have grown to believe that because of their intelligence, things should always come easily to them, and thus may lag behind their non-gifted peers in the work ethic required to learn things that don't come immediately to them. One apparently effective way to attempt to reverse underachievement in gifted children includes educating teachers to provide enrichment projects based on students' strengths and interests without attracting negative attention from peers.

www.numerons.in

Depression

It has been thought in the past that there is a correlation between giftedness and depression or suicide. This has generally not been proven. As Reis and Renzulli mention,

"With the exception of creatively gifted adolescents who are talented in writing or the visual arts, studies do not confirm that gifted individuals manifest significantly higher or lower rates or severity of depression than those for the general population...Gifted children's advanced cognitive abilities, social isolation, sensitivity, and uneven development may cause them to face some challenging social and emotional issues, but their problem-solving abilities, advanced social skills, moral reasoning, out-of-school interests, and satisfaction in achievement may help them to be more resilient."

www.numerons.in

Also, no research points to suicide rates being higher in gifted adolescents than other adolescents. However, a number of people have noted a higher incidence of existential depression, which is depression due to seemingly highly abstract concerns such as the finality of death, the ultimate unimportance of individual people, and the meaning (or lack thereof) of life. Gifted individuals are also more likely to feel existential anxiety.

However, numerous studies have shown that an active depressive state impairs cognition because it retards neurogenesis in the hippocampus.

www.numerons.in

Professional attitudes toward giftedness

Grobman discusses how some exceptionally and profoundly gifted individuals may unconsciously create deficits as a way of closing the asynchrony gap. Certain researchers, such as Stephanie Tolan, postulate that the attribution of controversial disorders such as "ADHD" — which other authors have argued has not been proven to exist by any means other than subjective behavioral analysis — to gifted individuals arises from a misguided tendency to pathologize that which we don't understand. Tolan also discusses that identifying as attention deficient has become fashionable in young adults. Although the diagnosis of ADHD is controversial, it is considered legitimate by organizations such as the American Academy of Pediatrics and the American Medical Association. Diagnostic criteria for ADHD have been established by the World Health Organization (in the ICD-10) and the American Psychiatric Association (in the DSM-IV).

Genetics and intelligence

www.numerons.in

Intelligence, which is a major component of giftedness, is influenced through a complex interaction of combinations of many genes and many different environmental contexts. Intelligence is a general cognitive ability that supports the fact that most reliable measures of cognitive abilities intercorrelate in some way. It is generally agreed that giftedness may have a genetic component.

Research on families has typically shown a correlation of about .45 in scores of g for parents, children, and siblings. Adoption and twin studies have also provided many valuable insights into the genetic component of intelligence. Studies of first degree relatives adopted apart show a correlation of .22, which is about half that of relatives who live together. Adopted children who are not related but reared together show a correlation of about .23 to genetically unrelated parents and siblings.

Heritability from adoption data is 44% for families, 52% for fraternal twins in a shared environment, and 72% for identical twins reared apart. The existing data for identical twins reared apart has been collected from studies conducted in adulthood and because heritability studies show that adults have higher heritability results than children, this number may be inflated. The question of whether intelligence has a genetic component has been confirmed through numerous studies. More research is necessary to determine the exact processes by which genetic dispositions interact with the environment.

www.numerons.in

Some children are born with innately higher intelligence levels than others. These children are often labeled as gifted or talented. Many researchers have investigated the early characteristics of gifted children. Hollingworth (1942) reported that 78 percent of the teachers agree that early detection of giftedness can be possible during early development. Children as young as preschool age tend to seek out highly stimulating environments. According to Raine, Reynolds, Venables, & Mednick (2002) increased stimulation seeking at age 3 years is associated with an increase in cognitive and scholastic test performance later in development. The advantages of identifying intellectual abilities of gifted children at an earlier age will allow educators to place them in the developmental classes that encourage and promote exploration in the domain of their giftedness.

www.numerons.in

Tannenbaum claims that the environment plays a major role in the nurturance of giftedness or higher intelligence. Giftedness and talent require a special environment just as special education would. The environment must be enriching and encouraging which will allow the child to mature through experience and exploration. The environment must facilitate creative activity in a developmentally appropriate manner which would call for classrooms to be designed for developmental levels as opposed to age or grade levelling. This type of environment with differentiated learning could result from acceleration, lateral enrichment, and special grouping. Also, a developmentally appropriate environment for the gifted child will reduce behavior problems among preschoolers due to an increased engagement and internal motivation for learning.

Furthermore, it is behavioral exploration of the environment that is indicative of the child's intellectual ability later in life. The child's innate motivation to engage in physical activity (hands-on learning) marks a curiosity which motivates task persistence. The increased physical exploration in a social play environment and goal-directed behavior in the stimulating environment facilitate superior cognitive functioning. In addition, gifted children will become high achievers when their interests are piqued by doing what they are innately motivated to do, empowering them to continue trying new skills. Furthermore, when gifted or talented children are supported by educational staff, their community, peers and families, they have higher possibilities to develop their cognitive abilities.

www.numerons.in

Talented students at the secondary level

What types of changes and support are needed to better enhance the development of talented adolescent students? Feldhusen (2003) addresses two major shifts in thinking needed to further the advancement of adolescents. Feldhusen proposes abandoning the program concept and the labeling of students as gifted. Programs are usually limited in time and are pull-outs that offer non-researched projects. The education of youth demands a wide diversity of experiences in accelerated courses plus extracurricular activities. Students may be served better when labeled talented instead of gifted. The term talent shows potential and suggests a developing ability.

www.numerons.in

Changes and support are embedded in Feldhusen's Purdue Pyramid Model of Talented Development which facilitates learners in developing a personal strong foundation based on talented learners accepting themselves as legitimate human beings to the ultimate

potential of realizing their commitment to the full development of one's ability and talent. Parent support is also critical in the development throughout the teenage years. Feldhusen stresses the importance of parental support. Parents provide financial and emotional support, guidance and motivation, and are a sounding board.

Genius

www.numerons.in

Genius (plural geniuses) is something or someone embodying exceptional intellectual ability, creativity, or originality, typically to a degree that is associated with the achievement of unprecedented insight.

There is no scientifically precise definition of genius, and indeed the question of whether the notion itself has any real meaning is a subject of current debate. The term is used in various ways: to refer to a particular aspect of an individual, or the individual in their entirety; to a scholar in many subjects (e.g. Leonardo da Vinci) or a scholar in a single subject (e.g. Albert Einstein or Richard Feynman). Research into what causes genius and mastery is still in its early stages, but psychology already offers relevant insights.

Origin of the word

In ancient Rome, the genius (plural genii) was the guiding spirit or tutelary deity of a person, family (gens), or place (genius loci). The noun is related to the Latin verb gigno, genui, genitus, "to bring into being, create, produce." Because the achievements of exceptional individuals seemed to indicate the presence of a particularly powerful genius, by the time of Augustus the word began to acquire its secondary meaning of "inspiration, talent."

www.numerons.in

Historical development

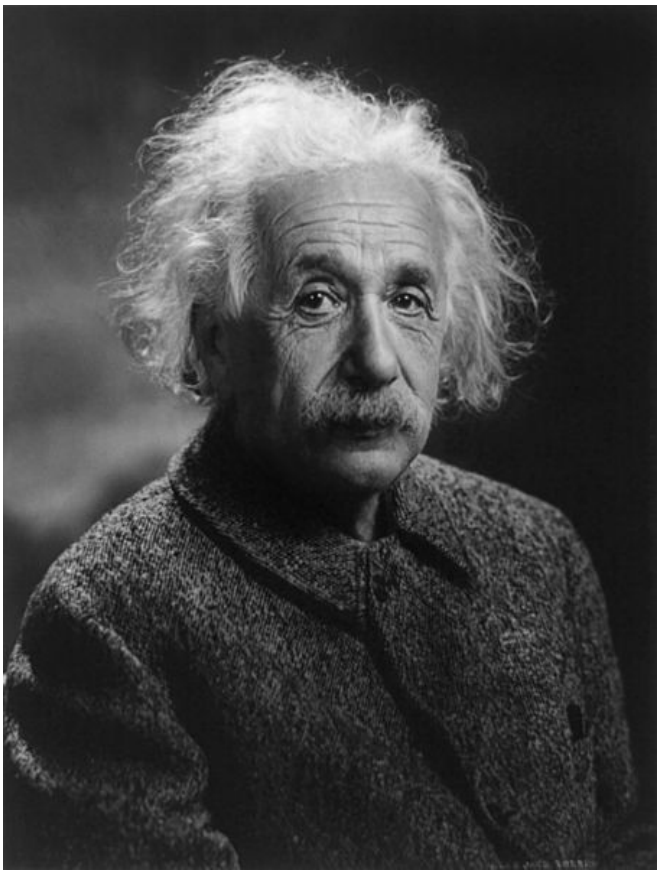
Galton

The assessing of intelligence was initiated by Francis Galton and James McKeen Cattell. They had advocated the analysing of reaction time and sensory acuity as measures of "neurophysiological efficiency" and the analysing of sensory acuity as a measure of intelligence. By intelligence, they meant a heritable trait, which was a general intelligence factor.

Galton is regarded as the founder of psychometry (among other kinds of assessing, such as fingerprinting). He studied the work of Charles Darwin. Charles Darwin showed that traits must be inherited before evolution can occur. Reasoning that eminence is caused by genetic traits he did a study of their heritability, publishing it in 1869 as Hereditary Genius. His method was to count and assess the eminent relatives of eminent men. He found that the number of eminent relatives is greater with closer degree of kinship, indicating to him that a genetic trait is present in an eminent line of descent that is not present in other lines. This

www.numerons.in

work is considered the first example of historiometry, an analytical study of historical human progress.



Albert Einstein, a 20th-century symbol of scientific genius.

Galton's theories were elaborated from the work of two early 19th-century pioneers in statistics: Karl Friedrich Gauss and Adolphe Quetelet. Gauss discovered the normal distribution (bell-shaped curve): Given a large number of measurements of the same variable under the same conditions, they vary at random from a most frequent value, the "average," to two least frequent values at maximum differences greater and less than the most frequent value. Quetelet discovered that the bell-shaped curve applied to social statistics gathered by the French government in the course of its normal processes on large numbers of people passing through the courts and the military. His initial work in criminology led him to observe "the greater the number of individuals observed the more do peculiarities become effaced..." This ideal from which the peculiarities were effaced became "the average man."

www.numerons.in

Himself a child prodigy, Galton was inspired by Quetelet to define the average man as "an entire normal scheme"; that is, if one combines the normal curves of every measurable human characteristic, one will in theory perceive a syndrome straddled by "the average man" and flanked by persons that are different. In contrast to Quetelet, Galton's average man was not statistical, but was theoretical only. There was no measure of general averageness, only a large number of very specific averages. Setting out to discover a

general measure of the average, Galton looked at educational statistics and found bell-curves in test results of all sorts; initially in mathematics grades for the final honors examination and in entrance examination scores for Sandhurst.

Galton now departed from Gauss in a way that became crucially significant to the history of the 20th century AD. The bell-shaped curve was not random, he concluded. The differences between the average and the upper end were due to a non-random factor, "natural ability," which he defined as "those qualities of intellect and disposition, which urge and qualify men to perform acts that lead to reputation ... a nature which, when left to itself, will, urged by an inherent stimulus, climb the path that leads to eminence." The apparent randomness of the scores were due to the randomness of this natural ability in the population as a whole, in theory.

Galton was looking for a combination of differences that would reveal "the existence of grand human animals, of natures preeminently noble, of individuals born to be kings of men." Galton's selection of terms influenced Binet: geniuses for those born to be kings of men and "idiots and imbeciles", two English pejoratives, for those at the other extreme of the "normal scheme." Darwin read and espoused Galton's work. Galton went on to develop the field of eugenics.

Psychology

Genius is expressed in a variety of forms (e.g. mathematical, literary, performance) Genius may show itself in early childhood, as a prodigy with particular gifts (e.g. understanding), or later in life. Geniuses are often deemed as such after demonstrating great originality. They tend to have strong intuitions about their domains, and they build on these insights with tremendous energy. There is also cited link between creativity of genius and genetic mutations linked to psychosis.

Malcolm Gladwell explains: Wayne Gretzky is widely regarded as having mastered ice hockey.

A hypothesis called multiple intelligences put forth by Harvard University professor Howard Gardner in his 1983 book Frames of Mind states there are at least seven types of intelligences, each with its own type of genius.

Malcolm Gladwell's book Outliers popularized a great deal of research into geniuses and mastery. Gladwell mentions the work of psychologist Anders Ericsson, who is an expert on expertise. As a result of his research, Ericsson suggests that it takes approximately 10,000 hours of deliberate practice to master something - what he calls the "10,000 rule". The book, Outliers, spends a great deal of time discussing various other elements of chance that play a role in the creation of a genius, including Robert K. Merton's "Mathew Effect" (e.g. the rich get richer).

www.numerons.in

According to Ericsson, mentors play an important role in attaining mastery. Only so much can be taught, however, since many of a genius' skills may be implicit, meaning it is difficult for them to explain in words (i.e. make explicit) how they do what they do.

The book of Character Strengths and Virtues is an attempt by psychologists to propose values for humans to live by. One of the inspirations for this list of values is child prodigies and the characteristics they exhibit.

IQ tests

One usage of the noun "genius" is closely related to the general concept of intelligence. One currently accepted way of attempting to measure one's intelligence is with an IQ test. The label of "genius" for persons of high IQ was popularized by Lewis Terman. He and his colleague Leta Hollingworth suggested different scores as a cut-off for genius in psychometric terms. Terman considered it to be an IQ of 140, while Hollingworth put it at an IQ of 180.

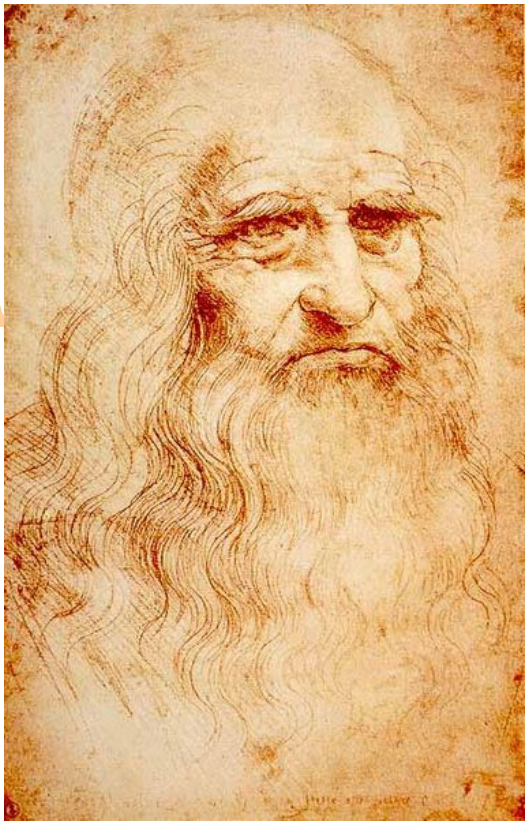
www.numerons.in

In addition to the fundamental criticism that intelligence measured in this way is an example of reification and ranking fallacies, the IQ test has also been criticized as having a "cultural bias" in its interpretation despite assurances that these tests are designed to eliminate test bias.

Anders Ericsson argues that generally (with highly demanding fields like theoretical physics as the exception), after a person's IQ surpasses 120, their success is determined more by other qualities. In other words, there may be general decreasing return on raw mental power. Ericsson proposes social skills as an example of other qualities that are then more relevant to success. He also warns that IQ does not measure what many would consider "creativity" - sometimes measured by looking at an individual's Latent inhibition instead of IQ.

Philosophy

www.numerons.in



Leonardo da Vinci is widely acknowledged as having been a genius and a polymath.

Various philosophers have proposed definitions of what genius is and what that implies in the context of their philosophical theories.

In the philosophy of Arthur Schopenhauer, a genius is someone in whom intellect predominates over "will" much more than within the average person. In Schopenhauer's aesthetics, this predominance of the intellect over the will allows the genius to create artistic or academic works that are objects of pure, disinterested contemplation, the chief criterion of the aesthetic experience for Schopenhauer. Their remoteness from mundane concerns means that Schopenhauer's geniuses often display maladaptive traits in more mundane concerns; in Schopenhauer's words, they fall into the mire while gazing at the stars, an allusion to Plato's dialogue Theætetus, in which Socrates tells of Thales (the first philosopher) being ridiculed for falling in such circumstances.

“Talent hits a target no one else can hit; Genius hits a target no one else can see.”

—Arthur Schopenhauer

In the philosophy of Immanuel Kant, genius is the ability to independently arrive at and understand concepts that would normally have to be taught by another person. For Kant, originality was the essential character of genius. This genius is a talent for producing ideas which can be described as non-imitative. Kant's discussion of the characteristics of genius

is largely contained within the Critique of Judgement and was well received by the Romantics of the early 19th century.

In the philosophy of David Hume, the way society perceives genius is similar to the way society perceives the ignorant. Hume states that a person with the characteristics of a genius is looked at as a person disconnected from society, as well as a person who works remotely, at a distance, away from the rest of the world. "On the other hand, the mere ignorant is still more despised; nor is any thing deemed a surer sign of an illiberal genius in an age and nation where the sciences flourish, than to be entirely destitute of all relish for those noble entertainments. The most perfect character is supposed to lie between those extremes; retaining an equal ability and taste for books, company, and business; preserving in conversation that discernment and delicacy which arise from polite letters; and in business, that probity and accuracy which are the natural result of a just philosophy."

In the philosophy of Nietzsche, genius is merely the context which leads us to consider someone a genius. In Twilight of the Idols, Nietzsche writes, "Great men, like great epochs, are explosive material in whom tremendous energy has been accumulated; their prerequisite has always been, historically and physiologically, that a protracted assembling, accumulating, economizing and preserving has preceded them – that there has been no explosion for a long time." In this way, Nietzsche follows in the line of German Idealism.

In the philosophy of Bertrand Russell, genius entails that an individual possesses unique qualities and talents that make the genius especially valuable to the society in which he or she operates. However, Russell's philosophy further maintains that it's possible for such a genius to be crushed by an unsympathetic environment during his or her youth. Russell rejected the notion he believed was popular during his lifetime that, "genius will out."

Child prodigy

Israeli conductor and pianist Daniel Barenboim, age 11, with Conductor Moshe Lustig and the Gadna Symphonic orchestra 1953

A child prodigy is someone who, at an early age, masters one or more skills far beyond their level of maturity. One criterion for classifying prodigies is: a prodigy is a child, typically younger than 18 years old, who is performing at the level of a highly trained adult in a very demanding field of endeavour.

The giftedness of prodigies is determined by the degree of their talent relative to their ages. Examples of particularly extreme prodigies could include Mozart or Béla Bartók in music, Judit Polgar in chess, Carl Friedrich Gauss, Srinivasa Ramanujan and John von Neumann in mathematics, Pablo Picasso in art, and Saul Kripke in philosophy. There is controversy as to at what age and standard to use in the definition of a prodigy.

The term Wunderkind (from German: "wonder child") is sometimes used as a synonym for prodigy, particularly in media accounts, although this term is discouraged in scientific

literature. Wunderkind also is used to recognize those who achieve success and acclaim early in their adult careers, such as Allen Lin, Steven Spielberg, Steve Jobs, Matthew Doherty, and Fred Goodwin.

Memory capacity of prodigies

PET scans performed on several mathematics prodigies have suggested thinking in terms of long-term working memory (LTWM). This memory, specific to a field of expertise, is capable of holding relevant information for extended periods, usually hours. For example, experienced waiters have been found to hold the orders of up to twenty customers in their heads while they serve them, but perform only as well as an average person in number-sequence recognition. The PET scans also answer questions about which specific areas of the brain associate themselves with manipulating numbers.

One subject never excelled as a child in mathematics, but he taught himself algorithms and tricks for calculatory speed, becoming capable of extremely complex mental math. His brain, compared to six other controls, was studied using the PET scan, revealing separate areas of his brain that he manipulated to solve the complex problems. Some of the areas that he and presumably prodigies use are brain sectors dealing in visual and spatial memory, as well as visual mental imagery. Other areas of the brain showed use by the subject, including a sector of the brain generally related to childlike "finger counting," probably used in his mind to relate numbers to the visual cortex.

Working Memory/Cerebellum Theory of Child Prodigies

www.numerons.in

Noting that the cerebellum acts to streamline the speed and efficiency of all thought processes, Vandervert explained the abilities of prodigies in terms of the collaboration of working memory and the cognitive functions of the cerebellum. Citing extensive imaging evidence, Vandervert first proposed this approach in two publications which appeared in 2003. In addition to imaging evidence, Vandervert's approach is supported by the substantial award winning studies of the cerebellum by Masao Ito.

Vandervert provided extensive argument that, in the prodigy, the transition from visual-spatial working memory to other forms of thought (language, art, mathematics) is accelerated by the unique emotional disposition of the prodigy and the cognitive functions of the cerebellum. According to Vandervert, in the emotion-driven prodigy (commonly observed as a "rage to master") the cerebellum accelerates the streamlining of the efficiencies of working memory in its manipulation and decomposition/re-composition of visual-spatial content into language acquisition and into linguistic, mathematical, and artist.

Nature versus nurture in the development of the prodigy

www.numerons.in

Some researchers believe that prodigious talent tends to arise as a result of the innate talent of the child, and the energetic and emotional investment that the child ventures. Others believe that the environment plays the dominant role, many times in obvious ways.

For example, László Polgár set out to raise his children to be chess players, and all three of his daughters went on to become world-class players (two of whom are grandmasters), emphasizing the potency a child's environment can have in determining the pursuits toward which a child's energy will be directed, and showing that an incredible amount of skill can be developed through suitable training.

But on the other hand George Frideric Handel was an example of the natural talent .... "he had discovered such a strong propensity to Music, that his father who always intended him for the study of the Civil Law, had reason to be alarmed. He strictly forbade him to meddle with any musical instrument but Handel found means to get a little clavichord privately convey'd to a room at the top of the house. To this room he constantly stole when the family was asleep". At an early age Handel became a skillful performer on the harpsichord and pipe organ and later went on to compose music which is listened to this day.

www.numerons.in

Late bloomer

A late bloomer is a person whose talents or capabilities are not visible to others until later than usual. The term is used metaphorically to describe a child or adolescent who develops more slowly than others in their age group, but eventually catches up and in some cases overtakes their peers, or an adult whose talent or genius in a particular field only appears later in life than is normal - in some cases only in old age.

Children

www.numerons.in

Thomas Edison as a boy

www.numerons.in

"Late Bloomer" is commonly used to refer to young children who develop skills such as language, reading or social interaction later than others of their age.

There are many theories of the way in which children develop, proposed by authorities such as Urie Bronfenbrenner, Jerome Bruner, Erik Erikson, Jerome Kagan, Lawrence Kohlberg, Jean Piaget and Lev Vygotsky. Although they disagree about how stages of development should be defined, and about the primary influences on development, they agree that a child's development can be measured as a predictable series of advances in physical, intellectual and social skills which almost always occur in the same sequence, although the rate may vary from one child to another.

www.numerons.in

When a child falls behind their peers at some stage of development, their teacher may perceive that the child is "backward". There is strong evidence that this perception may become self-fulfilling: although the child catches up, the teacher may continue to rate their performance poorly, imposing a long-term handicap. Thomas Edison's mind often wandered and his teacher was overheard calling him "addled." This ended Edison's three months of official schooling. His mother then home schooled him. Edison may have had some form of Attention-deficit hyperactivity disorder (ADHD), which is said to affect about 3 - 5% of children.

Albert Einstein in 1893 (age 14)

www.numerons.in

A notable example of a child who overcame early developmental problems is Albert Einstein, who suffered from speech difficulties as a young child. Other late-talking children who became highly successful engineers, mathematicians and scientists include the

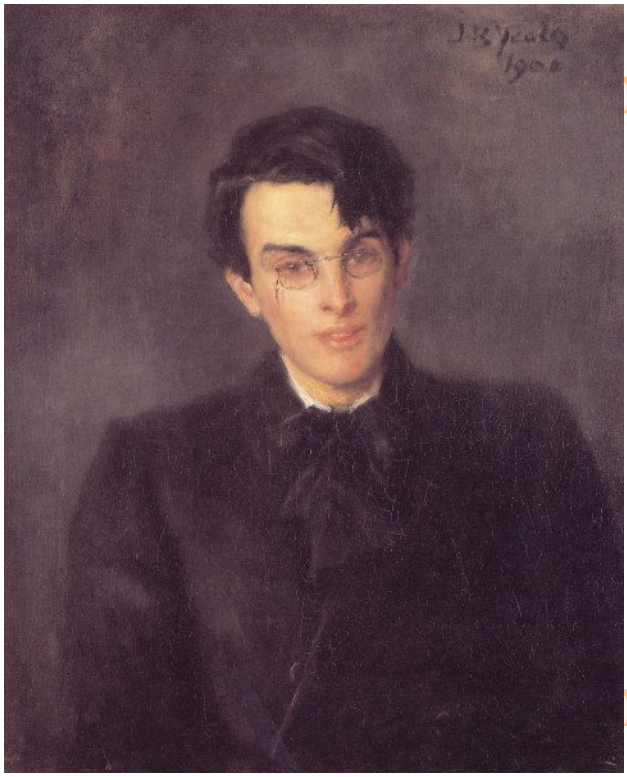
physicists Richard Feynman and Edward Teller. Neuroscientist Steven Pinker postulates that a certain form of language delay may in fact be associated with exceptional and innate analytical prowess in some individuals.

Dyslexia is a learning disability that may affect 3% - 10% of children. It is thought to be the result of a genetically inherited neurological difference from "normal" children, and has been diagnosed in people of all levels of intelligence. Studies indicate that 20% to 35% of U. S. and British entrepreneurs have the condition: by definition, late bloomers. Researchers theorise that dyslexic entrepreneurs may attain success by delegating responsibilities and excelling at verbal communication. Richard Branson, known for his Virgin brand of over 360 companies is a notable example, as is Charles R. Schwab the founder and CEO of the Charles Schwab Corporation. Pablo Picasso, Tom Cruise and Whoopi Goldberg are other examples of dyslexics, considered "slow" as children.

www.numerons.in

The autism spectrum of psychological conditions affects about 0.6% of children, characterized by widespread abnormalities of social interactions and communication, severely restricted interests and highly repetitive behavior. Notable individuals with autism spectrum disorders include Tim Page, a Pulitzer Prize-winning critic and author and Vernon L. Smith, a Nobel Laureate in economics.

Adolescents



Portrait of young William Butler Yeats by his father, John Butler Yeats

During adolescence a child goes through physical and mental changes that lead to them becoming an adult. Adolescence is usually considered to start with the first stages of puberty and to continue until physical growth is complete, although the World Health Organization defines adolescence simply as the period between ages 10 and 20. There is a wide range of normal ages, but generally girls begin the process of puberty between the ages of 9 to 14, reaching adult height and reproductive maturity within 4 years, while boys usually start between the ages of 10 to 17, and continue to grow for about 6 years after the first visible pubertal changes. Adolescence is often a period of turbulent emotions and mood swings combined with rapid intellectual development.

www.numerons.in

"Late Bloomer" can refer to children who suffer from delayed puberty, who are late in reaching their full height. W.B. Yeats (age 30),Pierre Trudeau (age at least 28),Mark Twain (age 34), and Johann von Goethe (age 39) are all "late bloomers" in this last sense.

In most public educational systems, children and adolescents of the same age are put in the same classes. Because of the wide variance in the onset of adolescence, this means that one class may include individuals who have not yet started puberty, others who are sexually mature but not fully grown and yet others who are effectively adult. During this period, there is a high risk of an adolescent dropping out of formal education (due most commonly to intellectual boredom, bullying, or rebellion) without having achieved their full learning potential. The term "late-bloomer" may refer to such an individual who develops serious intellectual interests in their 20's or 30's and enrolls in college, where he or she performs particularly well and is subsequently able to establish a professional career.

Adults

www.numerons.in

A late blooming adult is a person who does not discover their talents and abilities until later than normally expected. In certain cases retirement may lead to this discovery.

Some notable examples of late bloomers in different fields follow.

Acting

In acting Danny Aiello did not begin acting until he was 40. Peg Phillips might be one of the best examples as she first pursued acting as a professional after her retirement from accounting. Although not a noteworthy actress Clara Peller might be noted for having an even later start in entertainment. Richard Farnsworth became an actor after 40 years as a stunt man, although he had had a few small uncredited roles when younger. Rodney Dangerfield was an actor/comedian who didn't really start until he was 42. He had done clubs when he was younger, but stopped in order to work as a salesman. Zelda Rubinstein was 48 before she had her first role, a minor part in Under the Rainbow, but is more known for her "debut" in the Poltergeist film series starting the following year. Chicago native, Chi McBride, best known for the role as the principal in the series Boston Public, only got into acting when he was 31. Danny Glover had a brief stint in the career of politics before he had involved himself in acting at 28. BAFTA winning British actress Liz Smith did not become a professional actress until the age of 50. Kathryn Joosten also got a late start. Television star

www.numerons.in

Judd Hirsch from Taxi became active at the age of 36. George Wendt who played Norm on Cheers became active at the age of 32. Brian Dennehy had dreams of stage and screen at an early age, but chose to first pursue other interests such as service in the U.S. Marine Corps prior to becoming active at the age of 38. Irish actor Brendan Gleeson, who appeared as Mad Eye Moody in the Harry Potter films and alongside Colin Farrell in In Bruges, started acting at 34, having previous work as a school teacher.

Art

www.numerons.in

Grandma Moses

In art "late bloomers" are most often associated with Naïve art. This term is used for untrained artists so fits those who start late in life without artistic training. Hence the classic late bloomer is Grandma Moses whose painting career began in her seventies after abandoning a career in embroidery because of arthritis. An even older example is Bill Traylor who started drawing at age 83. Another painter who started late in life is Alfred Wallis who began painting after his wife's death in his 60s.

Business

In business Irene Wells Pennington became best known in her nineties when she helped straighten out irregularities in her husband's oil business after he went senile in his own 90s. Colonel Sanders began his franchise in his sixties and can also be deemed a late in life financial success. In his mid-50s Taikichiro Mori founded the business that made him, for a year or two, the richest man in the world. He came from a merchant family, but had been a business professor before his 50s.

Dance

www.numerons.in

Japanese dancer and choreographer Kazuo Ohno did not undertake formal dance lessons until his late twenties and was 43 years old when he performed his first recital at Kanda Kyoritsu Hall in Tokyo in 1949. A decade later, he and colleague Tatsumi Hijikata would achieve worldwide acclaim as the nucleus of the Butoh dance movement.

Games and Sports

In professional sports, an athlete's career usually ends in the mid-to-late 30s, so a player who breaks through in his late 20s/early 30s would be considered a late bloomer. One such example is Kurt Warner, who entered the NFL at age 28, and went on to become a two-time MVP and Super Bowl champion. Baseball pitcher Randy Johnson, who made his Major League debut at 25, but didn't reach superstar status until he was 30, might also be considered a late bloomer, as might defender Marco Materazzi of Inter Milan, who started playing football professionally at 26. Former NBA star, Hakeem Olajuwon did not touch a basketball until he was 15, but his athleticism and fundamentals from the sports, soccer and handball, helped him advanced as one of the greatest bigmen to ever play in the NBA.

www.numerons.in

Oscar Swahn at the 1912 Olympic Games, aged 60

In shooting there have been two figures of note whose accomplishments occurred in their sixties or later. Joshua Millner of Britain was 61 when he won his Olympic gold medal in Free rifle, 1000 yards. Swedish marksman Oscar Swahn won two Olympic gold medals in the running deer, single shot event at the age of 60. He won his last medal, silver, at 72 making him the oldest medalist. In athletics Philip Rabinowitz set a sprinting record for centenarians.

Jonah Barrington, a squash player, overcame alcoholism to later become a 6 times British Open Squash champion, and was regarded as one of the fittest men on the planet.

www.numerons.in

Heavyweight champions Ken Norton and Rocky Marciano did not take up boxing until their twenties, but both enjoyed successful careers at the highest level of competition.

Music

Musical ability is inherent in almost all people, to a greater or lesser extent. However, those who develop it to a high level are generally encouraged to play an instrument or to sing at an early age. Late bloomers in music are generally composers or artists who became prominent later in life, but had displayed musical ability much earlier.

Anton Bruckner is an example of a musical late bloomer. Although he played church organ some in his twenties he did not become a composer until his 40s. Singer K. T. Oslin released her first album at age 47 which was a major country music success. Al Jarreau is also an example, who released his first album at age 35. AERIA Recording Artist Colie Brice released his 10th solo album Late Bloomer at 39. Elliott Carter did not achieve compositional maturity until his Cello Sonata (1948), when he was 40. César Franck and Leoš Janáček also matured late as composers; 56, for Franck with his first Symphony in D; and, for Janáček, Jenufra (1904) marked his first true breakthrough at age 50. Iannis Xenakis did not even begin studying composition until 30, with Messiaen. Leonard Cohen did not release his first album until he was 32 years old.

www.numerons.in

Filmmaking

Manoel de Oliveira

Though many filmmakers begin directing in their late 20s or early 30s, many of the most notable directors in film history waited until their mid-to-late-30s to direct their first feature. These directors include Nicholas Ray, Alain Resnais, Edward Yang, Michael Mann, Paul Verhoeven, Frank Tashlin, Robert Aldrich, Satyajit Ray, Anthony Mann, Terry Gilliam, Jerry Lewis, Tsai Ming-liang, Don Siegel, Melvin Van Peebles, Gaspar Noé, Lloyd Bacon, Alexander Kluge, Mrinal Sen, Jean-Marie Straub, Ida Lupino, Alexander Payne, Ang Lee and Jacques Rivette. David Mamet directed his first feature at 40, having already found success

www.numerons.in

and been awarded a Pulitzer Prize as a playwright. Éric Rohmer directed his first feature film at 39, though he didn't become a full-time filmmaker until he was in his late 40s.

Many notable directors started even later: Robert Bresson, Jacques Tati and Takeshi Kitano directed their first features at 42; Maurice Pialat at 43; Michael Haneke at 47; Jim Sheridan at 40 and his peer and fellow collaborator Terry George at 46. Yevgeni Bauer at 48. Clint Eastwood, the oldest person to win the Academy Award for Best Director, directed his first film at 41.

www.numerons.in

One of the most shining examples of late bloomers in filmmaking is the Portuguese director Manoel de Oliveira. Born in 1908, he worked sporadically in filmmaking from the 1930s. He completed his first feature film in 1941 called Aniki-Bobo. Due to circumstances beyond his control (difficulty in financing, having to deal with his family's business), he didn't complete his second feature film until 1971 (when he turned 63). 2 years later, he completed his third feature film, Benilde or the Virgin Mother (1973). Five years later, he made his breakthrough film (originally commissioned by Portuguese TV) called Doomed Love. After his critically acclaimed film Francisca (1981), he became a full time filmmaker (at the age of 73).

Politics

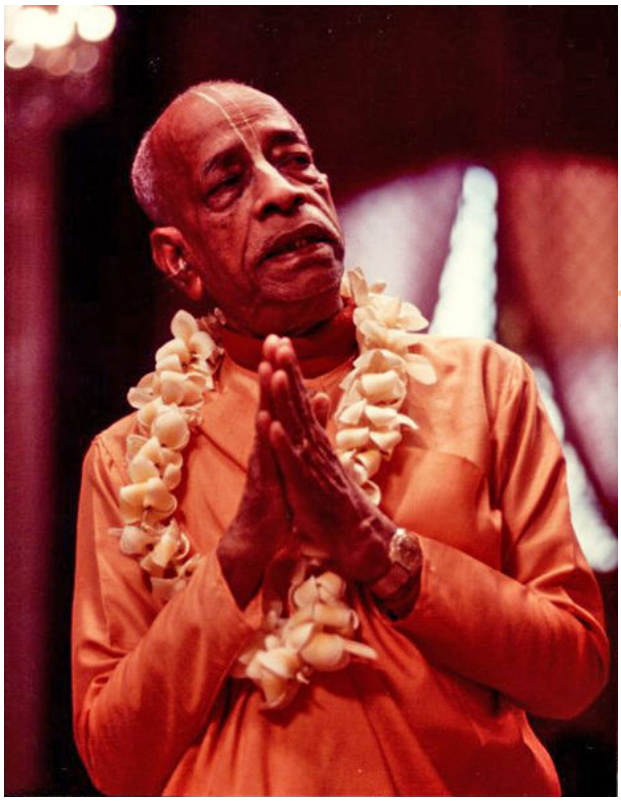
It is common for politicians to achieve prominence late in life, often after a career in business or the law. For example, in the United States Congress as of January 2009, of 540 elected officials 215 had worked in the legal profession and 189 had worked in private sector business. The average age of senators was 62. A lawyer or businessperson who moves into politics later in life is presumably putting existing skills to a new use, and should not be considered a late bloomer. However, some highly successful politicians come from unusual backgrounds.

www.numerons.in

Václav Havel, born in 1936, was a playwright and writer with an interest in human rights. He became the voice of the opposition in Czechoslovakia in the 1980s and President of Czechoslovakia at age 53 after the collapse of the communist regime in 1989. Ronald Reagan, a former actor, union leader and corporate spokesman, was first elected to public office at 55 when he became Governor of California and remains the oldest man to have served as U.S. President. Melchora Aquino was an uneducated Filipino peasant woman, the mother of six children, who became an activist in the fight to gain independence from Spain. Known as the Grand Woman of the revolution, she was 84 when the Philippine Revolution broke out in 1896. Silas C. Swallow was a minister who became a Prohibition Party activist in his sixties. Marjory Stoneman Douglas's might also fit. Her first environmental work of note occurred when she was almost 60, at 78 she founded "Friends of the Everglades", and she continued until she was over age 100.

www.numerons.in

Religion



A.C. Bhaktivedanta Swami Prabhupada

The great proponent of Gaudiya Vaishnavism A.C. Bhaktivedanta Swami Prabhupada founded the International Society for Krishna Consciousness or the Hare Krishna movement in 1966 at the age of 70. Within the final twenty years of his life Prabhupada translated over sixty volumes of classic Vedic scriptures (such as Bhagavad Gita and Bhagavata Purana) into the English language.

Writing

Many writers have published their first major work late in life. Mary Wesley might be a classic example. She wrote two children's books in her late fifties, but her writing career did not gain note until her first novel at 70, written after the death of her husband. Harriet Doerr published her first novel at age 74, and went on to great praise. A possibly more well known example might be Laura Ingalls Wilder. She became a columnist in her forties, but did not publish her first novel in the Little House series of children's books until her sixties.

Memoirist and novelist Flora Thompson was first published in her thirties but is most famous for the semi-autobiographical Lark Rise to Candleford trilogy, the first volume of which was published when she was 63. Children's author Mary Alice Fontenot wrote her first book at 51 and wrote almost thirty additional books, publishing multiple volumes in her eighties and nineties. Kenneth Grahame was born in 1859, joined the Bank of England in 1879 and rose through the ranks to become its Secretary. Although he had written various short stories while working at the bank, it was only after his retirement in 1908 that he published his masterpiece and final work The Wind in the Willows.

Charles Bukowski published his first novel at age 49 after a lengthy career working odd jobs and then at a post office. Richard Adams's first novel, the bestseller Watership Down, was published when he was in his fifties. Anthony Burgess, the novelist best known for A Clockwork Orange, published his first novel at age 39. William S. Burroughs was also 39 when he published his first novel, Junky. The Marquis de Sade published his first novel, Justine, after turning 51. Henry Miller published his novel Tropic of Cancer at 44. Raymond Chandler published his first short story at 45, and his first novel, The Big Sleep at 51.

www.numerons.in

In other areas of writing, poet Wallace Stevens started late in life after years as an insurance salesman and executive. Although he was first published at 38, his "canonical works" came out in his fifties. In philosophy Mary Midgley had her first book when she was 56. Edmond Hoyle wrote a booklet on whist in his late sixties. To avoid unauthorized copies he wrote the copyrighted A Short Treatise on the Game of Whist at age 70.

The Indian writer and polymath Nirad C. Chaudhuri wrote his autobiography The Autobiography of an Unknown Indian at the age of 54. He wrote a sequel to it Thy Hand, Great Anarch! at the age of 90. He published his next work (and his final work) Three Horsemen of the New Apocalypse at the age of 100.

Aron Ettore Schmitz published his first novel Senilità in his 38th year, however it was not until he published Zeno's Conscience that he made a breakthrough, aged 61. Even this was self-published.

www.numerons.in

Joseph Conrad was one of the greatest authors in the English language. He could not speak a word of English until he was about 21. He only started writing in English at about age 32, and his first published works came out when he was about 37.

Whiz kid

The whiz kid is usually a stock character, with a specific personality type. Traits tend to include high intelligence, lack of physical strength, being mentally intimidating, knowledge, and confidence. The term "whiz kid" can apply to both males and females. They are usually characterized as wearing glasses, somewhat overdressed or touting an unusual style than the rest of the group (this may include button-up shirts, suspenders, and gelled, parted hair or other, slightly dated, wear). The whiz may be a back-formation from the word wizard, with its connotations of uncanny skill.

The whiz kid usually has interests in books, science and technology, and more recently the stereotype has interests in computers and the Internet. The whiz kid character usually takes pride in being smart, and often uses big words (sometimes to show off, or to confuse and manipulate other, less intelligent characters). The whiz kid character usually uses his (or her) superior knowledge to help the main characters of a story accomplish some goal. A whiz kid can also be intended as an exceptionally talented and comparatively young person (especially a newcomer) who shows great promise in a particular field.

www.numerons.in

Often the whiz kid character is the hero's sidekick, but may also be the lead character or comic relief.

Derogatory references may include: "geeks" or "nerds". A whiz kid character who is male is often referred to as a "boy genius."

Multipotentiality

www.numerons.in

Multipotentiality is an educational and psychological term referring to a pattern found among intellectually gifted individuals.

"Because gifted students generally have diverse interests across numerous domains and may be capable of success in many endeavors or professions, they are confronted with unique decisions as a result of these choices. When encountering multiple opportunities, some students may experience confusion, anxiety and frustration because they fear missing something or making a wrong decision." -"An Investigation of Multipotentiality Among University Honors Students" Laurie Diane Shute, University of Connecticut (Dissertation)

While there is some dispute as to the degree of prevalence of this phenomenon, it is a significant problem for those who experience it, leading to overscheduling, high stress levels, and impulsive or conformist choices in gifted children, and to feelings of social alienation, purposelessness, apathy and depression in the brightest of adults.

www.numerons.in

Leonardo da Vinci may be the best historical example of an acknowledged genius who struggled with the difficulties associated with multipotentiality. He failed to complete many of the projects he started, and has been quoted as saying:

"I have wasted my hours"

and

"I have offended God and mankind because my work did not reach the quality it should have."

Gifted At-Risk

Gifted students are inherently at-risk. They are more likely than average to experience academic failure and to develop social and emotional issues. This concept was formally set forth in 1972 in the U.S. in the Marland Report, by then U.S. Commissioner of Education, S. P. Marland:

www.numerons.in

Gifted and Talented children are, in fact, deprived and can suffer psychological damage and permanent impairment of their abilities to function well which is equal to or greater

than the similar deprivation suffered by any other population with special needs served by the Office of Education.

Specific Risks

At first glance, labeling gifted children 'at-risk' seems to be questionable to those who are unfamiliar with the research . However, the following risks are listed in The Social and Emotional Development of Gifted Children :

www.numerons.in

- frustration, irritability, anxiety, tedium, and social isolation. (p. 11)
- intense social isolation and stress among those with IQ greater than 160. (p. 14)
- difficulty making friends due to advanced concept of friendship, mostly among those less than age 10. (p. 23)
- de-motivation, low self-esteem, and social rejection among the exceptionally gifted. (p. 26)
- emotional awareness beyond their ability to control. (p. 34)
- difficulty with peer relations proportional to their IQ. (p. 35)
- loneliness, anxieties, phobias, interpersonal problems, fear of failure, and perfectionism. (p. 43)
- underachievement for social acceptance (p. 64)
- lack of resilience reinforced by easy work and well-intentioned but misguided praise (p. 65)
- increasing perfectionism throughout school years among girls. (p. 75)
- fear of failure and risk avoidance due to perfectionism. (p. 75)
- depression among creatively gifted. (p. 93)

www.numerons.in

There is a cause-and-effect relationship between the unmet learning needs of gifted students and the above risks. "...Research indicates that many of the emotional and social difficulties gifted students experience disappear when their educational climates are adapted to their level and pace of learning."

Linda Kreger Silverman enumerates these additional risks:

- refusal to do routine, repetitive assignments
- inappropriate criticism of others
- lack of awareness of impact on others
- difficulty accepting criticism
- hiding talents to fit in with peers
- nonconformity and resistance to authority
- poor study habits

www.numerons.in

Further, there exists anecdotal evidence of truancy problems with gifted children, who sometimes miss school because of disengagement, and worse, fear of bullying. In 1999, legislation was introduced in Colorado to recognize gifted students as at-risk, with truancy as a factor, but the bill did not become law.

Lastly, meta-analysis from the paper "Gifted Students Who Drop Out—Who and Why: A Meta-Analytical Review of the Literature" by Kaskaloglu shows two key points. First, 4.5% of high school dropouts are gifted, and they leave school in part because of school-related issues. To understand the drop out rate, one must consider that the study cited indicates the percentage of children who both dropped out and who scored above 130 on an IQ test. One would expect a very small percentage of such children to drop out, given the ease with which they can excel in school. To expect more than one in ten would be hard to justify. Therefore, with only 2.27% of people scoring above 130 on IQ tests, to expect greater than 0.227% of dropouts to be gifted would be ostensibly far-fetched. Unfortunately, the actual percentage is closer to twenty times that. According to the Achievement Trap, this problem is even more pronounced among economically disadvantaged children.

www.numerons.in

Marland report

The Marland report is a 1972 report to the Congress of the United States by S. P. Marland, which contains a widely known definition of giftedness of children. It is the first national report on gifted education. One of its most compelling major findings was:

Gifted and Talented children are, in fact, deprived and can suffer psychological damage and permanent impairment of their abilities to function well which is equal to or greater than the similar deprivation suffered by any other population with special needs served by the Office of Education. (pp. xi-xii)

The deleterious effects of failing to provide GT services is corroborated by recent research:

www.numerons.in

National efforts to increase the availability of a variety of appropriate instructional and out-of-school provisions must be a high priority since research indicates that many of the emotional or social difficulties gifted students experience disappear when their educational climates are adapted to their level and pace of learning."

The other summary conclusions in the Marland Report are as follows:

- The U.S. had between 1.5 and 2.5 million gifted and talented (GT) students, and only a small fraction received appropriate educational services.
- Federal, state, and local authorities considered differentiated education for these students to be a low priority.
- The existing legislation in 21 states was largely ineffective.
- Funding, various crises, and personnel shortages undermined GT services.
- Identification of GT students was hampered not only by testing costs, but by both apathy and hostility among teachers, administrators, guidance counselors and psychologists.
- Services for GT students inherently serve disadvantaged populations (with the implication that GT incidence is universal).
- Effective, measurable means of serving GT students were in existence.

www.numerons.in

- State and local education agencies looked to the Federal government for leadership.
- The Federal role in the delivery of GT services was virtually non-existent.

Regarding the final point, after nearly four decades, the Federal government's stance is unchanged, allocating 0.02% of its budget (approximately $10 million of $54 billion in 2007) to GT education (Jacob Javits Gifted and Talented Students Education Act). A partial electronic version of the Marland Report is available online.

www.numerons.in

Underachiever

An underachiever is a person and especially a student who fails to achieve his or her potential or does not do as well as expected.

Of particular interest is academic underachievement. Studies of individuals who have not realised their apparent potential have identified learning disabilities, ADD, and many other educational problems, and enabled methods of addressing these problems to be developed. Current theories among academic scholars prefer to address underperformance problems with remedial help. Academic under-achievement can also be attributed to relatively intelligent or gifted students, but they do not perform as expected either because they are bored or choose not to excel.

The term is also used more generally, for example a team that contains many star players but still loses games against teams with relatively little obvious talent would be termed underachieving. A stock which achieves poor profit and/or capital gains despite sound underlying business and/or asset backing may be called underachieving.

www.numerons.in

Gifted education

Gifted education (also known as Gifted and Talented Education (GATE), Talented and Gifted (TAG), or G/T) is a broad term for special practices, procedures and theories used in the education of children who have been identified as gifted or talented. There is no standard global definition of what a gifted student is.

Commonly used terms in gifted education

Differentiation

Modification of a gifted student's curriculum to accommodate their specific needs. This may include changing the content or ability level of the material.

Affective curriculum

www.numerons.in

A curriculum that is designed to teach gifted students about emotions, self-esteem, and social skills. This can be valuable for all students, especially those who have been grouped with much older students, or who have been rejected by their same-age, but academically typical, peers.

Heterogeneous grouping

A strategy that groups students of varied ability or accomplishment in a single classroom environment.

Homogeneous grouping

A strategy that groups students by specific ability, interest, or subject area.

Individualized Education Program (IEP)

www.numerons.in

A written document that addresses a student's specific individual needs. It may specify accommodations, materials, or classroom instruction. IEPs are often created for students with disabilities, who are required by law to have an IEP when appropriate. Most states are not required to have IEPs for students who are only identified as gifted. Some students may be intellectually gifted in addition to having learning and/or attentional disabilities, and may have an IEP that includes, for instance, enrichment activities as a means of alleviating boredom or frustration, or as a reward for on-task behavior. In order to warrant such an IEP, a student needs to be diagnosed with a separate emotional or learning disability that is not simply the result of being unchallenged in a typical classroom. These are also known as Individual Program Plans, or IPPs.

Forms of gifted education

Attempts to provide gifted education can be classified in several ways. Most gifted students benefit from a combination of approaches at different times.

Hobby

www.numerons.in

Activities such as reading, creative writing, sport, computer games, chess, music, dance, foreign languages, art give an extra intellectual challenge outside of school hours.

Enrichment

On the primary school level, students spend all class time with their peers, but receive extra material to challenge them. Enrichment may be as simple as a modified assignment provided by the regular classroom teacher, or it might include formal programs such as Odyssey of the Mind, Destination Imagination or academic competitions such as Brain Bowl, Future Problem Solving, National History Day, science fairs, or spelling bees. This work is done in addition to, and not instead of, any regular school work assigned. Critics of this approach argue that it requires gifted students to do more work instead of the same amount at an advanced level. On the secondary school level sometimes an option is to take more courses like English, Spanish, Latin, Philosophy, Science, etc., or to engage in extra curricular activities. Some perceive there to be a necessary choice between enrichment and acceleration, as if the two were mutually exclusive alternatives. However, other researchers see the two as complements to each other.

www.numerons.in

Compacting

The regular school material is compacted by pretesting the student to establish which skills and content have already been mastered. Pretests can be presented on a daily basis (pupils doing the most difficult items on a worksheet first and skipping the rest if they are performed correctly), or before a week or longer unit of instructional time. When a student demonstrates an appropriate level of proficiency, further repetitive practice can be safely skipped, thus reducing boredom and freeing up time for the student to work on more challenging material.

www.numerons.in

Self-pacing

Self-pacing methods, such as the Montessori Method, use flexible grouping practices to allow children to advance at their own pace. Self-pacing can be beneficial for all children and is not targeted specifically at those identified as gifted or talented, but it can allow children to learn at a highly accelerated rate. Directed Studies are usually based on self-pacing.

Acceleration

Pupils are advanced to a higher-level class covering material more suited to their abilities and preparedness. This may take the form of skipping grades or completing normal curriculum in a shorter-than-normal period of time ("telescoping"). Subject acceleration (also called partial acceleration) is a flexible approach which can advance a student in one field, such as mathematics or language, without changing other studies, such as history or physical education

www.numerons.in

Some colleges offer early entrance programs that give gifted younger students the opportunity to attend college early. In the U.S., many community colleges allow advanced students to enroll with the consent of school officials and the pupils' parents.

Acceleration presents gifted children academic material from established curricula that is commensurate with their ability and preparedness, and for this reason is a low-cost option from the perspective of the school. This may result in a small number of children taking classes targeted at older children. However, for the majority of gifted students, acceleration is beneficial both academically and socially. "Radical acceleration (acceleration by two or more years) is effective academically and socially for highly gifted students." Some advocates have argued that the disadvantages of being retained in a standard mixed-ability classroom are substantially worse than any shortcomings of acceleration. For example, psychologist Miraca Gross reports: "the majority of these children [retained in a typical classroom] are socially rejected [by their peers with typical academic talents], isolated, and deeply unhappy. Children of IQ 180+ who are retained in the regular classroom are even more seriously at risk and experience severe emotional distress." These accelerated children should be placed together in one class if possible.

www.numerons.in

Pull-Out

Gifted students are pulled out of a heterogeneous classroom to spend a portion of their time in a gifted class. These programs vary widely, from carefully designed half-day academic programs to a single hour each week of educational challenges. Generally, these programs are ineffective at promoting academic advancement unless the material covered contains extensions and enrichment to the core curriculum. The majority of pull-out programs include an assortment of critical thinking drills, creative exercises, and subjects typically not introduced in standard curriculums. Much of the material introduced in Gifted pull-out programs deals with the study of Logic, and its application to fields ranging from Philosophy to Mathematics. Students are encouraged to apply these empirical reasoning skills to every aspect of their education both in and outside of class.

www.numerons.in

Cluster Grouping

Cluster grouping is the gathering of four to six gifted and talented and/or high achieving students in a single classroom for the entire school day. Cluster teachers are specially trained in differentiating for gifted learners. Clusters are typically used in upper elementary grades. Within a cluster group, instruction may include enrichment and extensions, higher-order thinking skills, pretesting and differentation, compacting, an accelerated pace, and more complexity in content.

Summer Enrichment Programs (United States)

These offer a variety of courses that mainly take place in the summer. Summer schools are popular in the USA. Entrance fees are required for such programs, and programs typically focus on one subject, or class, for the duration of the camp.

www.numerons.in

Several examples of this type of program are:

GERI: Gifted Education Resource Institute, Purdue University

The Johns Hopkins University

C-MITES Center for Talented Youth

CTYI

West Virginia Wesleyan College

Center for Talent Development

Plymouth Antiquarian Society

www.numerons.in

Western Kentucky University Center for Gifted Studies

There are also several websites that list summer enrichment programs:

Purdue University GERI Youth Programs

Summer Institute for the Gifted

National Association for Gifted Children

National Society for the Gifted and Talented

www.numerons.in

Within the United States, in addition to programs designed by the state, some counties also choose to form their own Talented and Gifted Programs. Sometimes this means that an individual county will form its own TAG program; sometimes several counties will come together if not enough gifted students are present in a single county. Generally, a TAG program focuses on a specific age group, particularly the local TAG programs. This could mean elementary age, high school age, or by years such as ages 9 through 14.

These classes are generally organized so that students have the opportunity to choose several courses they wish to participate in. Courses offered often vary between subjects, but are not typically strictly academically related to that subject. For example, a TAG course that could be offered in history could be the students learning about a certain event and then acting it out in a performance to be presented to parents on the last night of the program. These courses are designed to challenge the students to think in new ways and not merely to be lectured as they are in school.

Full-time separate classes or schools

www.numerons.in

Gifted students are educated in either a separate class or a separate school. Classes like this are sometimes called "Congregated Gifted Classes". In the Netherlands these schools are called the Leonardoschool. They are popular and growing fast.

Separate or independent schools are schools with a primary mission to serve the needs of the academically gifted. Such schools are relatively scarce and often difficult for families to locate. Such schools often need to work to guard their mission from occasional charges of elitism, support the professional growth and training of their staff, write curriculum units that are specifically designed to meet the social, emotional, and academic talents of their students, and educate their parent population at all ages.

Some gifted and talented classes offer directed studies, where the students lead a class themselves and decide on their own projects, tests, and all other assignments.

These separate classes or schools tend to be more expensive than regular classes, due to the smaller number of kids in a classroom. They are in high demand and parents have to pay part of the costs.

www.numerons.in

Homeschooling in the US

An umbrella term encompassing myriad educational options for gifted children: part-time schooling; school at home; classes, groups, mentors and tutors; and unschooling. In many US states, the population of gifted students who are being homeschooled is rising quite rapidly, as school districts responding to budgetary issues and standards-based policies are cutting what limited gifted education programs remain extant, and families seek educational opportunities that are tailored to each child's unique needs.

Controversies

www.numerons.in

Controversies concerning gifted education are varied and often highly politicized. They are as basic as agreeing upon the appropriateness of the term 'gifted' or the definition of 'giftedness'. For example, does 'giftedness' refer to performance or potential (such as inherent intelligence)? Many students do not exhibit both at the same time.

Measures of general intelligence also remain controversial. Early IQ tests were notorious for producing higher IQ scores for privileged races and classes and lower scores for disadvantaged subgroups. Although IQ tests have changed substantially over the past half century, and many objections to the early tests have been addressed by 'culture neutral' tests (such as the Raven test), IQ testing remains controversial.

Some schools and districts only accept IQ tests as evidence of giftedness. This brings scrutiny to the fact that many affluent families can afford to consult with an educational psychologist to test their children, whereas families with a limited income cannot afford the test and must depend on district resources.

www.numerons.in

Gifted programs are often seen as being elitist in places where the majority of students receiving gifted services are from a privileged background.

Appropriateness of forms of gifted education

This is the most hotly debated aspect of gifted education. Some people believe that gifted education resources lack availability and flexibility. They feel that in the alternative methods of gifted education, the gifted students "miss out" on having a "normal" childhood, at least insofar as "normal childhood" is defined as attending school in a mixed-ability classroom. Others believe that gifted education allows gifted students to interact with peers that are on their level, be adequately challenged, and leaves them better equipped to take on the challenges of life.

Another facet of this controversy is the effectiveness of the programs dependent upon resources that are pushed more toward students who are struggling. Gifted Education is not mandated in many states, making it elective for districts to earmark money for. Many lower-achieving districts and schools must make crisis decisions on programs that are not high priorities. As a result, gifted students at these schools are not served, or not served effectively.

www.numerons.in

Impact on other parts of the education system

Some critics have claimed that gifted programs result in educational triage, with the gifted program taking a disproportionate amount of school resources, leaving other pupils with much reduced resources. (See, for example, the writings of Mara Sapon-Shevin.) There is little evidence of such effects, especially in contrast with the resource consumption of special education programs.

www.numerons.in

The most common gifted programs are also the lowest cost: skipping grades and modified assignments in the regular classroom. Further, the U.S. Federal government allocated 0.02% of its education budget (approximately $10 million of $54 billion in 2007) to gifted and talented education via the Jacob Javits Gifted and Talented Students Education Act.

Gifted programs can also face problems of ostracism directed towards the gifted students by regular students. Gifted students in the same school but under a separate program may be victims of bullying because of their intellectual gifts, since such characteristics might fuel a bully's insecurity and make them objects of abuse. Such programs can result in gifted students' being discriminated against by other pupils.

Emotional aspects of gifted education

While giftedness is seen as an academic advantage, psychologically it can pose other challenges for the gifted individual. A person who is intellectually advanced may or may not be advanced in other areas. Each individual student needs to be evaluated for physical, social, and emotional skills without the traditional prejudices which either prescribe either "compensatory" weaknesses or "matching" advancement in these areas.

www.numerons.in

A person with significant academic talents often finds it difficult to fit in with schoolmates. These pressures often wane during adulthood, but they can leave a significant negative impact on emotional development.

Social pressures can cause children to "play down" their intelligence in an effort to blend in with other students. "Playing down" is a strategy often used by students with clinical depression and is seen somewhat more frequently in socially acute adolescents. This behavior is usually discouraged by educators when they recognize it. Unfortunately, the very educators who want these children to challenge themselves and to embrace their gifts and talents are often the same people who are forced to discourage them in a mixed-ability classroom, through mechanisms like refusing to call on the talented student in class so that typical students have an opportunity to participate.

www.numerons.in

Students who are young, enthusiastic or aggressive are more likely to attract attention and to disrupt the class by working ahead, giving the correct answers all the time, asking for new assignments, or finding creative ways to entertain themselves while the rest of the class finishes an assignment. This behavior can be mistaken for ADHD.

It can also happen that some unidentified gifted students will get bored in regular class, daydream and lose track of where the class is in a lecture, and the teacher becomes convinced that the student is slow and struggling with the material.

Finally, G&T students are statistically somewhat more likely to be diagnosed with a psychiatric disability such as bipolar disorder and to become addicted to drugs or alcohol. These additional issues can require special attention in school.

www.numerons.in

Justification

Advocates of gifted education contend that gifted and/or talented youth are either motivationally, perceptually or intellectually prepared for a challenge not offered in the standard curriculum, so that it is appropriate to pace their lessons more aggressively by encouraging them to participate in honors courses, Advanced Placement courses, International Baccalaureate courses, and other sources of educational enrichment and acceleration.

They also claim that the needs of many gifted students are still neglected, as schools tend to place emphasis on improving education for the "average" student or students at the margin of success. Some argue that too many resources are diverted from gifted education to the other end of the special education spectrum, disabled students. This may be an unintended consequence of the development of disability rights litigation, which some pundits argue has led to the disabled receiving escalating resources at the expense of needed growth for gifted programs and even for core curricula (see special education). However, many advocates believe that both special education and gifted education deserve more resources, on the general principle that each child should receive a challenge appropriate to his preparedness and motivation.

www.numerons.in

The families of gifted and/or disabled students are often dissatisfied with the education system, which, while it may suit the majority of students, often fails to provide for those with special needs.

Researchers and practitioners in gifted education contend that, if education were to follow the medical maxim of "first, do no harm," then no further justification would be required for providing resources for gifted education as they believe gifted children to be at-risk. The notion that gifted children are "at-risk" was publicly declared in the Marland Report in 1972:

Gifted and Talented children are, in fact, deprived and can suffer psychological damage and permanent impairment of their abilities to function well which is equal to or greater than the similar deprivation suffered by any other population with special needs served by the Office of Education. (pp. xi-xii)

www.numerons.in

Three decades later, a similar statement was made by researchers in the field:

National efforts to increase the availability of a variety of appropriate instructional and out-of-school provisions must be a high priority since research indicates that many of the emotional or social difficulties gifted students experience disappear when their educational climates are adapted to their level and pace of learning."

History

BCE to the Renaissance

www.numerons.in

Gifted and talented education dates back thousands of years. In China's Tang Dynasty (580-618 CE), child prodigies were summoned to the imperial court for specialized education. Plato (c. 427–c. 347 BCE) advocated providing specialized education for intellectually gifted young men and women. Throughout the Renaissance, those who exhibited creative talent in art, architecture, and literature were supported by both the government and private patronage.

Sir Francis Galton

One of the earliest western studies of high function in humans was completed by Sir Francis Galton, who between 1888 and 1894 developed and compiled measurements of over 7,500 individuals to gauge their natural intellectual abilities. In his studies he determined that if a parent deviates from the norm, so will the child, but to a lesser extent. Galton believed that people could be improved through engineered heredity, a movement he named eugenics. He categorized people into gifted, capable, average, or degenerate and recommended breeding between the first two categories, and forced abstinence from the latter two. His term for the most intelligent and talented people was "eminence", and after studying England's most prominent families, determined that one's eminence was directly related to his direct hereditary line.

www.numerons.in

Lewis Terman

At Stanford University in 1916, Lewis Terman adapted Alfred Binet's intelligence test into the Stanford-Binet test, and created the term "intelligence quotient" (IQ). According to Terman, the IQ was one's mental age compared to one's physical age, as compared to a sampling of other people within one's age range. He defined intelligence as "the ability to carry on abstract thinking". The US Army commissioned Terman as a major during World War I, and for the first time, intelligence testing was given to a wide population of drafted soldiers. Using his own adaptation of intelligence testing, Terman developed percentiles and determined that the most gifted fell within the top 2% of scores from the Stanford-Binet. Terman undertook extensive longitudinal studies of 1,500 children in California who scored within the top 2% - a score of 140 or above - and continued to evaluate them throughout their lives. Subjects of these case studies were called "Termites" and the studies began in 1921, and again in 1930, 1947, and 1959 after his death. Terman's studies have to date been the most extensive on high-functioning children, and are still quoted in literature today. Common misconceptions, such as that highly intelligent children were prone to ill physical and mental health, that their intelligence burned out early in their lives, or that

www.numerons.in

they either achieved greatly or underachieved, were dispelled by Terman's studies. Instead, he found that there is little relationship to the achievements of highly intelligent children in later life, and that weakness and insanity were not directly linked to high intelligence.

Leta Hollingworth

A professional colleague of Terman's, Leta Hollingworth was the first in the United States to study how best to serve students who showed evidence of high performance on tests. Although recognizing Terman's and Galton's beliefs that heredity played a vital role in intelligence, Hollingworth gave similar credit to home environment and school structure. Hollingworth worked to dispel the pervasive belief that "bright children take care of themselves" and emphasized the importance of early identification, daily contact, and grouping gifted children with others with similar abilities. Hollingworth performed an 18-year-long study of 50 children in New York City who scored 155 or above on the Stanford-Binet, and studied smaller groups of children who scored above a 180. She also ran a school in New York City for bright students that employed a curriculum of student-led exploration, as opposed to a teacher providing students with a more advanced curriculum they would encounter later in life.

The Cold War

One unforeseen result of the launch of Sputnik by the Soviet Union was the immediate emphasis on education for bright students in the United States, and this settled the question whether the federal government should get involved in public education at all. The National Defense Education Act (NDEA) was passed by Congress in 1958 with $1 billion US to bolster science, math, and technology in public education. Educators immediately pushed to identify gifted students and serve them in schools. Students chosen for gifted services were given intelligence tests with a strict cutoff, usually at 130, which meant that students who scored below the 130 were not identified.

Marland Report

The impact of the NDEA was evident in schools for years after, but a study on how effective education was meeting the needs of gifted students was initiated by the United States Department of Education in 1969. The Marland Report, completed in 1972, for the first time presented a general definition of giftedness, and urged districts to adopt it. The report also allowed students to show high functioning on talents and skills not measurable by an intelligence test. The Marland Report defined gifted as

"Children capable of high performance include those with demonstrated achievement and/or potential ability in any of the following areas, singly or in combination:

- General intellectual ability,
- Specific academic aptitude,
- Creative or productive thinking,
- Leadership ability,

- Visual and performing arts, or
- Psychomotor ability."

The report's definition continues to be the basis of the definition of giftedness in most districts and states.

A Nation at Risk

www.numerons.in

In 1983, the result of an 18-month-long study of secondary students was published as A Nation at Risk, and was an eye-opening declaration that students in the United States were no longer receiving superior education, and in fact, could not compete with students from other developed countries in many academic exercises. One of the recommendations the book made was to increase services to gifted education programs, citing curriculum enrichment or acceleration specifically. The US federal government was also urged to create standards for the identification and servicing of gifted students.

Jacob Javits Gifted and Talented Students Education Act

The Jacob Javits Gifted and Talented Students Education Act was passed in 1988 as part of the Elementary and Secondary Education Act (ESEA). Instead of funding district-level gifted education programs, the Javits Act instead has three primary components: the research of effective methods of testing, identification, and programming, which is performed at the National Research Center on the Gifted and Talented; the awarding of grants to colleges, states, and districts that focus on underrepresented populations of gifted students; and grants awarded to state and districts for program implementation. Annual funding for grants must be passed by US Congress, and totaled $9.6 million US in 2007, but the money isn't promised. While he was President, George W. Bush eliminated the money every year of his term, but members of Congress overrode the president to make sure the grant money is distributed.

www.numerons.in

No Child Left Behind

The most recent US federal education initiative was signed into law in 2002. The goal of No Child Left Behind (NCLB) is to bring proficiency of all students to grade level, but critics note it does not address the needs of gifted students who perform above grade level. The act imposes punishments on schools, administrators, and teachers when students do not achieve to the plan's designs, but does not address any achievement standards for high functioning students, forcing schools and teachers to spend their time with low achieving students. An article in The Washington Post declared, "The unmistakable message to teachers -- and to students -- is that it makes no difference whether a child barely meets the proficiency standard or far exceeds it." Gifted services have been recently eroding as a result of the new legislation, according to a 2006 article in The New York Times.

www.numerons.in

A Nation Deceived

In 2004, the John Templeton Foundation sponsored a report titled A Nation Deceived: How Schools Hold Back America's Brightest Students, highlighting the disparity between the research on acceleration (which generally supports it, both from an academic and a psychological point of view), and the educational practices in the US that are often contrary to the conclusions of that research. The Institute for Research and Policy on Acceleration (IRPA) was established in 2006 at The Connie Belin & Jacqueline N. Blank International Center for Gifted Education and Talent Development at the University of Iowa through the support of the John Templeton Foundation following the publication of this report.

www.numerons.in

Studies of giftedness

Differences in intelligence have been known for recorded human history, but the development of early intelligence tests by Alfred Binet led to the Stanford-Binet IQ test which was developed by Lewis Terman, who began long-term studies of gifted children with a view to checking if the popular view "early to ripen, early to rot" was true. He showed this popular belief was false and many of the children (dubbed "Terman's termites") were studied for decades.

Modern studies by James and Kulik conclude that gifted students benefit least from working in a mixed-level class, and benefit most from learning with other similarly advanced students in accelerated or enriched classes.

Definition of giftedness

www.numerons.in

Educational authorities differ on the definition of giftedness: even when using the same IQ test to define giftedness, they may disagree on what gifted means - one may take up the top 2% of the population, another might take up the top 5% of a population, which may be within a state, district, or school. Within a single school district, there can be substantial differences in the distribution of measured IQ. (The IQ for the top percentile at a high-performing school may be quite different from that at a lower performing school.)

In Identifying Gifted Children: A Practical Guide, Susan K. Johnsen (2004) explains that gifted children all exhibit the potential for high performance in the areas included in the United States federal definition of gifted and talented students:

> The term 'gifted and talented' when used in respect to students, children, or youth means [those who show] evidence of high performance capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who require services or activities not ordinarily provided by the school in order to fully develop such capabilities.

www.numerons.in

— P.L. 103–382, Title XIV, p. 388

The National Association for Gifted Children in the U.S. defines giftedness as:

Students, children, or youth who give evidence of high achievement capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who need services and activities not ordinarily provided by the school in order to fully develop those capabilities

This definition has been adopted in part or completely by the majority of the states in the United States. Most have some definition similar to that used in the State of Texas, whose definition states:

www.numerons.in

[The phrase] 'gifted and talented student' means a child or youth who performs at or shows the potential for performing at a remarkably high level of accomplishment when compared to others of the same age, experience, or environment, and who:

- exhibits high performance capability in an intellectual, creative, or artistic area;
- possesses an unusual capacity for leadership; or
- excels in a specific academic field.

— 74th legislature of the State of Texas, Chapter 29, Subchapter D, Section 29.121

The major characteristics of these definitions are (a) the diversity of areas in which performance may be exhibited (e.g., intellectual, creative, artistic, leadership, academic), (b) the comparison with other groups (e.g., those in general education classrooms or of the same age, experience, or environment), and (c) the use of terms that imply a need for development of the gift (e.g., capability and potential).

www.numerons.in

Reliance on IQ

Some authors question the existence of "the g factor" and thus hold that the result of an IQ test is meaningless, rendering the notion of giftedness meaningless. The most famous example is The Mismeasure of Man by Stephen Jay Gould.

In her book, Identifying Gifted Children: A Practical Guide, Susan K. Johnsen (2004) argues that schools should use a variety of measures of students capability and potential when identifying gifted children. These measures may include portfolios of student work, classroom observations, achievement measures, and intelligence scores. Most educational professionals accept that no single measure can be used in isolation to accurately identify every gifted child.

Even if the notion of IQ is generally useful for identifying academically talented students who would benefit from further services, the question of the cutoff point for giftedness is still important. As noted above, different authorities often define giftedness differently.

www.numerons.in

The theory of positive disintegration

Overexcitability has been a popular theme in many gifted circles over the past twenty years. Overexcitability is a component of developmental potential, a part of Dabrowski's

Theory of Positive Disintegration (TPD), a theory of personality development. The application of TPD to gifted education is one of several (other applications include psychotherapy, personality theory, philosophy of Man, etc.).

Global implementation

United States

www.numerons.in

In the United States, each state department of education determines if the needs of gifted students will be addressed as a mandatory function of public education. If so, the state determines the definition of which students will be identified and receive services, but may or may not determine how they shall receive services. If a state does not consider gifted education mandatory, individual districts may, thus the definition of what gifted is varies from state or district.

In contrast with special education, gifted education is not regulated on a federal level, although recommendations by the US Department of Education are offered. As such, funding for services is not consistent from state to state, and although students may be identified, the extent to which they receive services can vary widely depending upon a state or district's budget.

United Kingdom

www.numerons.in

The National Academy for Gifted and Talented Youth ran 2002 to 2007 at the University of Warwick. Warwick University decided not to reapply for the contract to run NAGTY in 2007, instead introducing its own programme, the International Gateway for Gifted Youth in 2008. In January 2010, the government announced that NAGTY was to be scrapped the following month.

Republic of Ireland

The Centre for the Talented Youth of Ireland has run in Dublin City University since 1992.

Korea Republic

www.numerons.in

Following the Gifted Education Promotion Law in the year 2000, the Ministry of Education, Science, and Technology (MEST) founded the National Research Center for Gifted and Talented Education (NRCGTE) in 2002 to ensure effective implementation of gifted education research, development, and policy. The center is managed by the Korean Educational Development Institute (KEDI). 25 universities including Seoul National University, Pusan National University also conduct gifted and talented education research through its Science-gifted Education Center, as do KAIST through its Global Institute for Talented Education (GIFTED), the Korean Society for the Gifted and Talented and the Korean Society for the Gifted.

Education for the scientifically gifted in Korea can be traced back to the 1983 government founding of Gyeonggi Science High School. There are 20 science specialized high schools established currently. In 2003, under the Gifted Education Promotion Law, Korea Science Academy of KAIST as a first form of gifted school was opened with 144 nationwide selected students and following three later additions [Seoul Science High School, Gyeonggi Science High School [Daegu Science High School]])were changed into gifted school, approximately 1,500, or 1 in 1,300 (0.08 percent) of high school students are currently enrolled among its four gifted academies. By 2008, about 50,000, or 1 in 140 (0.7 percent) of elementary and middle school students participated in education for the gifted. In 2005, a program was undertaken to identify and educate gifted children of socioeconomically underprivileged people. Since then, more than 1,800 students have enrolled in the program.

www.numerons.in

Gradually the focus has expanded over time to cover informatics, arts, physical education, creative writing, humanities, and social sciences, leading to the 2008 creation of the government funded Korean National Institute for the Gifted Arts. To pluralize the need for trained professional educators, teachers undergo basic training (60 hours), advanced training (120 hours), and overseas training (60 hours) to acquire skills necessary to teach gifted youth.

Hong Kong

Government participation: Gifted Education in Hong Kong began in 1990 when the development of school-based Gifted Education was initiated by the Education Commission Report No.4.In 1992, a research team composed of professional academics was established to kick-start research studies on Gifted Education. In 1995, the Fung Hon Chu Gifted Education Center was established. In 2003, the Gifted Education Section of Education & Manpower Bureau was formally established and the Support Measures for the Exceptionally Gifted Students Scheme was launched. In 2008, the Hong Kong Academy for Gifted Education was set up by the HKSAR government to provide formal gifted education to selected gifted students in Hong Kong .

www.numerons.in

Iran

National Organization for Development of Exceptional Talents (NODET, also known as SAMPAD, which stands for in Persian, Sazman-e Melli-e Parvaresh-e Estedadha-ye Derakhshan) are national Middle and High Schools in Iran developed specifically for the development of exceptionally talented students in Iran. NODET was first established in 1976 and re-established in 1987.

Admission to Nodet schools is selective and based on a comprehensive nationwide entrance examination procedure.

www.numerons.in

Every year thousands of students apply to enter the schools, from which less than 5% are chosen for the 99 middle schools and 98 high-schools within the country. All applicants must have a minimum GPA of 19 (out of 20) for attending the entrance exam. In 2006, 87,081 boys and 83,596 girls from 56 cities applied, and finally 6,888 students were

accepted for the 2007 middle schools. The admission process is much more selective in big cities like Tehran, Isfahan and Karaj in which less than 150 students are accepted after two exams and interviews, out of over 50,000 applicants.

Three top schools of NODET (and also Iran's top) are Allameh Helli High School located in Tehran, Shahid Ejei High School located in Isfahan and Shahid Soltani High School located in Karaj.

www.numerons.in

Courses taught in NODET schools are college-level in fields such as biology, chemistry, mathematics, physics and English. The best teachers of the ministry of education are chosen mainly by the school's principal and faculty to teach at NODET schools. Schools mainly have only two majors (normal schools have three majors), math-physics and experimental sciences(like math-physics but having biology as the main course). Even though social sciences are taught, there is much less emphasis on these subjects due to the lack of interest in both students and the organization.

NODET students are very successful in Olympiads, occupying almost all places in the national Olympiads, and doing great in many international Olympiads.

Statistics show that NODET alumni usually pursue higher education until post-graduate level. Some NODET alumni are world class leading researchers in Science, Engineering, and Medicine.

Rationale for gifted programs

www.numerons.in

When children are young, schools begin to analyze the youngsters' abilities and sort them into clusters based on their predicted success. The system labels the cream of the crop as gifted. Clark (2002) defines giftedness as "only a label that society gives to those who have actualized their ability to an unusually high degree or give evidence that such achievement is imminent". So what exactly is this quality that schools are seeking out? The American government defines giftedness as "students, children or youth who give evidence of high performance capability in areas such as intellectual, creative, artistic, or leadership capacity, or in specific academic fields, and who require services or activities not ordinarily provided by the school in order to fully develop such capabilities" (Clark, 2002). Gifted students learn in a different manner and at an accelerated rate compared to their peers in the classroom and therefore require gifted programs to develop and apply their talents.

Gifted children need outside instruction and development opportunities to expand their minds and become most useful to society and themselves. In a list of reasons compiled in Fostering Academic Excellence, McLeod and Cropley (1989) describe the specific advantages to placing gifted children in adequate programs:

www.numerons.in

- "Gifted children are a resource"; here the need for inventive and intelligent minds who will improve the quality of life and advance in the new technological age is stated.

- "The gifted deserve special treatment corresponding to that received by the handicapped;" the gifted ought to have the same financial support that is given to other groups that are far from the "norm".
- "Gifted children need adequate stimulation;" a debate is raised between the incentive that gifted children gain by being in an isolated class of the top five-percent and the argument that normal and slow children would benefit from being mixed in with giftedness.
- "Special provision for the gifted will prevent dropouts, underachievement and delinquency;" gifted children may lose their zest for school when kept back from learning at their own pace and may almost strive to achieve "normality" to "have a quiet life in school". (McLeod & Cropley, 1989).

www.numerons.in

Not only is it important to give the gifted the extra push which is beneficial to society, those students' minds also operate in a unique way and require a different style of teaching. "The intellectually adept think and learn differently from others…it is important to teach them appropriately" (Freeman et al., 1999). As Merenheimo is quoted in the Journal of Biological Education, "gifted pupils have an analytic strategy of perceiving information. The less gifted use either atomistic or serialistic strategies" (Freeman et al., 1999). Gifted children were also found to be more ambitious—both in the difficulty and effort put into the task—in their schoolwork than others their age. (Freeman et al., 1999).

Schools should bear some responsibility to nurture the talents of the gifted students in their charge. "It is clear from the evidence that excellence does not emerge without appropriate help….To reach an exceptionally high standard in any area, potentially gifted children need the means to learn; this includes the material to work with and focused, challenging tuition, sometimes including tutoring or mentoring that is not provided in normal schools" (Freeman et al., 1999). Two methods mentioned by Freeman that schools use in the teaching of gifted children are: 1. Accelerating the learning of children, either by moving them up to an older age-group or compacting the material they have to learn, and 2. Enrichment, rounding out, and deepening the material to be learned (Freeman et al., 1999).

www.numerons.in

Classroom guidelines for teaching the gifted

- "To be at their most effective, pupils can be helped to identify their own ways of learning, which will include strategies of planning, monitoring, evaluation, and choice of what to learn. They should also be helped to be aware of their attitudes to the area to be learned, such as curiosity, persistence, and confidence." (Freeman et al., 1999).

www.numerons.in

- "All the evidence indicates that specific provision within subject areas is by far the most effective in promoting talent, rather than general enrichment without identified goals." (Freeman et al., 1999)

- "Meaningful curriculum experiences for gifted learners need to be carefully planned, written down, implemented, and evaluated in order to maximize potential effect." (Van Tassel-Baska, 2000)

- Giftedness "can be furthered only by participation in learning experiences that challenge and extend from the point of the child's talent, ability, and interest" (Clark, 2002).

www.numerons.in

- Gifted students, the unique "resources" of society, are not likely to reach their full potential with the setbacks of regular class-work which progresses at a slowed rate. These exceptional thinkers receive the desired enrichment only when put among other high-achievers with accelerated coursework and left room to develop their own ideas and viewpoints. There is a definite need for gifted programs, both in and out of school, to accommodate to the needs of intelligent and creative children.

Assessment

So now that the necessity of these gifted programs have been established, how then do schools and talent search programs identify who meet the criteria for being gifted? National Excellence: A Case for Developing America's Talent suggests that the following guidelines be used (Clark, 2002):

- Look at a variety of disciplines for outstanding students.
- Use a variety of tests and other assessment measures to find and serve students who express high levels of ability in different ways and at different ages.
- Ensure that all students have equal access to challenging learning opportunities and unbiased assessment.
- Develop assessment procedures that allow varying rates of maturity and interests.
- Seek students whose potential evidences itself in diverse and less obvious ways.
- Consider motivational factors such as interest, drive, and passion in assessing accomplishment.

www.numerons.in

There are six areas of ability which are often evaluated in order to determine whether or not a child is gifted: generic, cognitive, academic, creative, leadership, and visual and performing arts. They are measured in combinations of standardized tests, peer and teacher evaluations and nominations, and observations of the particular child. As for the legitimacy of these methods, Olszewski-Kubilius assures us that "the available research evidence suggests that these practices are valid" (Olszewski-Kubilius et al., 1998).

Learning disability

www.numerons.in

Learning disability (sometimes called a learning disorder or learning difficulty), is a classification including several disorders in which a person has difficulty learning in a typical manner, usually caused by an unknown factor or factors. The unknown factor is the disorder that affects the brain's ability to receive and process information. This disorder

can make it problematic for a person to learn as quickly or in the same way as someone who is not affected by a learning disability. People with a learning disability have trouble performing specific types of skills or completing tasks if left to figure things out by themselves or if taught in conventional ways.

Some forms of learning disability are incurable. However, with appropriate cognitive/academic interventions, many can be overcome. Individuals with learning disabilities can face unique challenges that are often pervasive throughout the lifespan. Depending on the type and severity of the disability, interventions may be used to help the individual learn strategies that will foster future success. Some interventions can be quite simplistic, while others are intricate and complex. Teachers and parents will be a part of the intervention in terms of how they aid the individual in successfully completing different tasks. School psychologists quite often help to design the intervention, and coordinate the execution of the intervention with teachers and parents. Social support can be a crucial component for students with learning disabilities in the school system, and should not be overlooked in the intervention plan. With the right support and intervention, people with learning disabilities can succeed in school and go on to be successful later in life.

www.numerons.in

Definitions

In the 1980s, the National Joint Committee on Learning Disabilities (NJCLD) defines the term learning disability as:

a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning or mathematical abilities. These disorders are intrinsic to the individual and presumed to be due to Central Nervous System Dysfunction. Even though a learning disability may occur concomitantly with other handicapping conditions (e.g. sensory impairment, mental retardation, social and emotional disturbance) or environmental influences (e.g. cultural differences, insufficient/inappropriate instruction, psychogenic factors) it is not the direct result of those conditions or influences.

www.numerons.in

The NJCLD used the term to indicate a discrepancy between a child's apparent capacity to learn and his or her level of achievement.

The 2002 LD Roundtable produced the following definition:

"Concept of LD: Strong converging evidence supports the validity of the concept of specific learning disabilities (SLD). This evidence is particularly impressive because it converges across different indicators and methodologies. The central concept of SLD involves disorders of learning and cognition that are intrinsic to the individual. SLD are specific in the sense that these disorders each significantly affect a relatively narrow range of academic and performance outcomes. SLD may occur in combination with other disabling conditions, but they are not due primarily to other conditions, such as mental retardation, behavioral disturbance, lack of opportunities to learn, or primary sensory deficits."

www.numerons.in

The term "learning disability" does not exist in DSM-IV, but it has been proposed that it be added to DSM-5, and incorporate the conditions learning disorder not otherwise specified and disorder of written expression.

Types of learning disabilities

Learning disabilities can be categorized either by the type of information processing that is affected or by the specific difficulties caused by a processing deficit.

www.numerons.in

By stage of information processing

Learning disabilities fall into broad categories based on the four stages of information processing used in learning: input, integration, storage, and output.

Input: This is the information perceived through the senses, such as visual and auditory perception. Difficulties with visual perception can cause problems with recognizing the shape, position and size of items seen. There can be problems with sequencing, which can relate to deficits with processing time intervals or temporal perception. Difficulties with auditory perception can make it difficult to screen out competing sounds in order to focus on one of them, such as the sound of the teacher's voice. Some children appear to be unable to process tactile input. For example, they may seem insensitive to pain or dislike being touched.

www.numerons.in

Integration: This is the stage during which perceived input is interpreted, categorized, placed in a sequence, or related to previous learning. Students with problems in these areas may be unable to tell a story in the correct sequence, unable to memorize sequences of information such as the days of the week, able to understand a new concept but be unable to generalize it to other areas of learning, or able to learn facts but be unable to put the facts together to see the "big picture." A poor vocabulary may contribute to problems with comprehension.

Storage: Problems with memory can occur with short-term or working memory, or with long-term memory. Most memory difficulties occur in the area of short-term memory, which can make it difficult to learn new material without many more repetitions than is usual. Difficulties with visual memory can impede learning to spell.

Output: Information comes out of the brain either through words, that is, language output, or through muscle activity, such as gesturing, writing or drawing. Difficulties with language output can create problems with spoken language, for example, answering a question on demand, in which one must retrieve information from storage, organize our thoughts, and put the thoughts into words before we speak. It can also cause trouble with written language for the same reasons. Difficulties with motor abilities can cause problems with gross and fine motor skills. People with gross motor difficulties may be clumsy, that is, they may be prone to stumbling, falling, or bumping into things. They may also have

www.numerons.in

trouble running, climbing, or learning to ride a bicycle. People with fine motor difficulties may have trouble buttoning shirts, tying shoelaces, or with handwriting.

By function impaired

Deficits in any area of information processing can manifest in a variety of specific learning disabilities. It is possible for an individual to have more than one of these difficulties. This is referred to as comorbidity or co-occurrence of learning disabilities. In the UK, the term dual diagnosis is often used to refer to co-occurrence of learning difficulties.

www.numerons.in

Reading disorder (ICD-10 and DSM-IV codes: F81.0/315.00)

The most common learning disability. Of all students with specific learning disabilities, 70%-80% have deficits in reading. The term "Developmental Dyslexia" is often used as a synonym for reading disability; however, many researchers assert that there are different types of reading disabilities, of which dyslexia is one. A reading disability can affect any part of the reading process, including difficulty with accurate or fluent word recognition, or both, word decoding, reading rate, prosody (oral reading with expression), and reading comprehension. Before the term "dyslexia" came to prominence, this learning disability used to be known as "word blindness."

Common indicators of reading disability include difficulty with phonemic awareness—the ability to break up words into their component sounds, and difficulty with matching letter combinations to specific sounds (sound-symbol correspondence).

www.numerons.in

Writing disorder (ICD-10 and DSM-IV codes F81.1/315.2)

Speech and language disorders can also be called Dysphasia/Aphasia (coded F80.0-F80.2/315.31 in ICD-10 and DSM-IV).

Impaired written language ability may include impairments in handwriting, spelling, organization of ideas, and composition. The term "dysgraphia" is often used as an overarching term for all disorders of written expression. Others, such as the International Dyslexia Association, use the term "dysgraphia" exclusively to refer to difficulties with handwriting.

Math disability (ICD-10 and DSM-IV codes F81.2-3/315.1)

Sometimes called dyscalculia, a math disability can cause such difficulties as learning math concepts (such as quantity, place value, and time), difficulty memorizing math facts, difficulty organizing numbers, and understanding how problems are organized on the page. Dyscalculics are often referred to as having poor "number sense".

www.numerons.in

Non ICD-10/DSM

- Nonverbal learning disability: Nonverbal learning disabilities often manifest in motor clumsiness, poor visual-spatial skills, problematic social relationships,

difficulty with math, and poor organizational skills. These individuals often have specific strengths in the verbal domains, including early speech, large vocabulary, early reading and spelling skills, excellent rote-memory and auditory retention, and eloquent self-expression.

- Disorders of speaking and listening: Difficulties that often co-occur with learning disabilities include difficulty with memory, social skills and executive functions (such as organizational skills and time management).

www.numerons.in

- Auditory processing disorder: Difficulties processing auditory information include difficulty comprehending more than one task at a time and a relatively stronger ability to learn visually.

Diagnosis

IQ-Achievement Discrepancy

Learning disabilities are often identified by school psychologists, clinical psychologists, and neuropsychologists through a combination of intelligence testing, academic achievement testing, classroom performance, and social interaction and aptitude. Other areas of assessment may include perception, cognition, memory, attention, and language abilities. The resulting information is used to determine whether a child's academic performance is commensurate with his or her cognitive ability. If a child's cognitive ability is much higher than his or her academic performance, the student is often diagnosed with a learning disability. The DSM-IV and many school systems and government programs diagnose learning disabilities in this way (DSM-IV uses the term "disorder" rather than "disability".)

www.numerons.in

Although the discrepancy model has dominated the school system for many years, there has been substantial criticism of this approach among researchers. Recent research has provided little evidence that a discrepancy between formally measured IQ and achievement is a clear indicator of LD. Furthermore, diagnosing on the basis of a discrepancy does not predict the effectiveness of treatment. Low academic achievers who do not have a discrepancy with IQ (i.e. their IQ scores are also low) appear to benefit from treatment just as much as low academic achievers who do have a discrepancy with IQ (i.e. their IQ scores are higher than their academic performance would suggest).

Response to Intervention (RTI)

Much current research has focused on a treatment-oriented diagnostic process known as response to intervention (RTI). Researcher recommendations for implementing such a model include early screening for all students, placing those students who are having difficulty into research-based early intervention programs, rather than waiting until they meet diagnostic criteria. Their performance can be closely monitored to determine whether increasingly intense intervention results in adequate progress. Those who respond will not require further intervention. Those who do not respond adequately to regular classroom instruction (often called "Tier 1 instruction") and a more intensive

www.numerons.in

intervention (often called "Tier 2" intervention) are considered "nonresponders." These students can then be referred for further assistance through special education, in which case they are often identified with a learning disability. Some models of RTI include a third tier of intervention before a child is identified as having a learning disability.

A primary benefit of such a model is that it would not be necessary to wait for a child to be sufficiently far behind to qualify for assistance. This may enable more children to receive assistance before experiencing significant failure, which may in turn result in fewer children who need intensive and expensive special education services. In the United States, the 2004 reauthorization of the Individuals with Disabilities Education Act permitted states and school districts to use RTI as a method of identifying students with learning disabilities. RTI is now the primary means of identification of learning disabilities in Florida.

The process does not take into account children's individual neuropsychological factors such as phonological awareness and memory, that can help design instruction. Second, RTI by design takes considerably longer than established techniques, often many months to find an appropriate tier of intervention. Third, it requires a strong intervention program before students can be identified with a learning disability. Lastly, RTI is considered a regular education initiative and is not driven by psychologists, reading specialists, or special educators.

Assessment

www.numerons.in

Many normed assessments can be used in evaluating skills in the primary academic domains: reading, including word recognition, fluency, and comprehension; mathematics, including computation and problem solving; and written expression, including handwriting, spelling and composition.

The most commonly used comprehensive achievement tests include the Woodcock-Johnson III (WJ III), Weschler Individual Achievement Test II (WIAT II), the Wide Range Achievement Test III (WRAT III), and the Stanford Achievement Test–10th edition. These tests include measures of many academic domains that are reliable in identifying areas of difficulty.

In the reading domain, there are also specialized tests that can be used to obtain details about specific reading deficits. Assessments that measure multiple domains of reading include Gray's Diagnostic Reading Tests–2nd edition (GDRT II) and the Stanford Diagnostic Reading Assessment. Assessments that measure reading subskills include the Gray Oral Reading Test IV – Fourth Edition (GORT IV), Gray Silent Reading Test, Comprehensive Test of Phonological Processing (CTOPP), Tests of Oral Reading and Comprehension Skills (TORCS), Test of Reading Comprehension 3 (TORC-3), Test of Word Reading Efficiency (TOWRE), and the Test of Reading Fluency. A more comprehensive list of reading assessments may be obtained from the Southwest Educational Development Laboratory.

The purpose of assessment is to determine what is needed for intervention, which also requires consideration of contextual variables and whether there are comorbid disorders that must also be identified and treated, such as behavioural issues or language delays.

Treatment and intervention

Interventions include:

www.numerons.in

Mastery model:

- Learners work at their own level of mastery.
- Practice
- Gain fundamental skills before moving onto the next level

Note: this approach is most likely to be used with adult learners or outside the mainstream school system.

Direct Instruction:

- Highly structured, intensive instruction
- Emphasizes carefully planned lessons for small learning increments
- Scripted lesson plans
- Rapid-paced interaction between teacher and students
- Correcting mistakes immediately
- Achievement-based grouping
- Frequent progress assessments

www.numerons.in

Classroom adjustments:

- Special seating assignments
- Alternative or modified assignments
- Modified testing procedures
- Quiet environment

Special equipment:

- Word processors with spell checkers and dictionaries
- Text-to-speech and speech-to-text programs
- Talking calculators
- Books on tape
- Computer-based activities such as the hundreds of free games linked to the Learning Disability Directory

www.numerons.in

Classroom assistants:

- Note-takers

- Readers
- Proofreaders
- Scribes

Special Education:

- Prescribed hours in a resource room
- Placement in a resource room
- Enrollment in a special school for learning disabled students
- Individual Education Plan (IEP)
- Educational therapy

www.numerons.in

Sternberg has argued that early remediation can greatly reduce the number of children meeting diagnostic criteria for learning disabilities. He has also suggested that the focus on learning disabilities and the provision of accommodations in school fails to acknowledge that people have a range of strengths and weaknesses, and places undue emphasis on academic success by insisting that people should receive additional support in this arena but not in music or sports. Other research has pinpointed the use of resource rooms as an important—yet often politicized component of educating students with learning disabilities.

Causes and risk factors

www.numerons.in

The causes for learning disabilities are not well understood, and sometimes there is no apparent cause for a learning disability. However, some causes of neurological impairments include:

- Heredity - Learning disabilities often run in the family.
- Problems during pregnancy and birth - Learning disabilities can result from anomalies in the developing brain, illness or injury, fetal exposure to alcohol or drugs, low birth weight, oxygen deprivation, or by premature or prolonged labor.
- Accidents after birth - Learning disabilities can also be caused by head injuries, malnutrition, or by toxic exposure (such as heavy metals or pesticides).

Impact on affected individuals

www.numerons.in

Neuropsychological differences can impact the accurate perception of social cues with peers. A diagnosis of a learning disability can be potentially devastating to an individual and their family. Both the individual and their family will need to learn methods of coping with the effects of the disorder; they will also need to learn how to cope with the disorder emotionally. Stress related to the disorder can accumulate, making the coping process difficult. Stigmas that friends/family/peers have about the learning disorder can also contribute to the stress level the individual feels. Learning disabilities are often present throughout the lifespan, so learning appropriate and effective methods of coping are essential to successful management of the disorder.

Social Correlates of Learning Disabilities

Learning Disability as a Social Construction

Learning disability theory is founded in a medical model, in that disability is perceived as an individual deficit that is biological in origin. Researchers working within a social model of disability assert that there are social or structural causes of disability and/or the assignation of the label of disability, and even that disability is entirely socially constructed. Since the turn of the 19th century, education in the United States has been geared toward producing citizens who can effectively contribute to a capitalistic society, with a cultural premium on efficiency and science. More agrarian cultures, for example, don't even use learning ability as a measure of adult adequacy, whereas learning disabilities are prevalent in Western capitalistic societies because of the high value placed on speed, literacy, and numeracy in both the labor force and school system. The notion of learning disabilities has been described as evidence of America's individualistic obsession with self-reliance. In the bigger picture, these points demonstrate how the label of disability is socially constructed and represents a lack of fit between Western conceptions of educational institutions and proper students.

Disproportionality in the U.S.

One of the most clear indications of the social roots of learning disabilities is the disproportionate identification of racial and ethnic minorities and students who have low socioeconomic status. While some attribute the disproportionate identification of racial/ethnic minorities to racist practices or cultural misunderstanding, others have argued that racial/ethnic minorities are overidentified because of their lower average SES. Similarities were noted between the behaviors of "brain-injured" and lower class students as early as the 1960s. The distinction between race/ethnicity and SES is important to the extent that these considerations contribute to the provision of services to children in need. While many studies have considered only one characteristic of the student at a time, or used district- or school-level data to examine this issue, more recent studies have used large national student-level datasets and sophisticated methodology to find that the disproportionate identification of African American students with learning disabilities can be attributed to their average lower SES, while the disproportionate identification of Latino youth seems to be attributable to difficulties in distinguishing between linguistic proficiency and learning ability. Although the contributing factors are complicated and interrelated, it is possible to discern which factors really drive disproportionate identification by considering a multitude of student characteristics simultaneously. For instance, if high SES minorities have rates of identification that are similar to the rates among high SES whites, and low SES minorities have rates of identification that are similar to the rates among low SES whites, we can know that the seemingly higher rates of identification among minorities result from their greater likelihood to have low SES. Summarily, because the risk of identification for white students who have low SES is similar to that of black students who have low SES, future research and policy reform should focus on identifying the shared qualities or experiences of low SES youth that lead to their disproportionate identification, rather than focusing exclusively on racial/ethnic

www.numerons.in

minorities. It remains to be determined why lower SES youth are at higher risk of incidence, or possibly just of identification, with learning disabilities.

Other Social Connections

Society both has an impact upon, and is impacted by, individuals with learning disabilities. Significant factors in this relationship include poverty (with its concomitant reliance on welfare/public assistance), gender, and crime/imprisonment.

www.numerons.in

Welfare/Public assistance relating to educational development

A 36 month study conducted by Taylor and Barusch included 284 welfare recipients, who were frequently interviewed, called, and visited with in their homes. In this study the average age was 34 and 97% of the participants were female. Of the welfare participants 22.9% were learning disabled and 32% had no high school diploma or GED. Findings from this study imply that long term learning disabled welfare recipients will not be able to support their family through employment.

A study conducted by Margai and Henry found that the laws of identifying special education children have been revised within the past years. Learning disabled children in public schools now make up 6% of all kids.

High risk neighborhoods and poor living conditions add to the factor of being more vulnerable to having a learning disability. A study was conducted exploring the areas of pollution and socioeconomic factors related to having a higher risk of a learning disability. Margai and Henry used primary data and analyzed clusters of people in a distinct part of a community near a toxic waste place, living in poor neighborhoods and living in poverty). The results confirmed that a majority of the people with a learning disability came from some socio-economic indicator such as poverty, subdivided housing, and lower adult educational attainment. Individuals with a learning disability will rely more heavily on public assistance/welfare than individuals who do not because of their lack of knowledge.

www.numerons.in

Gender issues

Researchers believe that there are more boys in special education programs compared to girls. Coutinho and Oswald found that data was collected from the U.S. office of Civil Rights to view the underrepresentation of females in special education. Oswald found that 73% of learning disabled individuals in special education programs were boys.

However, the ratio of boys to girls (having a learning disability) is equal. In dealing with learning disabilities no significant gender differences were found in a study of more than 400 children. Bandian found that if identified by research criteria there were no differences in gender, but if learning disabilities were identified by general education teachers and/or special education teachers, there was twice as many boys identified compared to girls. Alongside that, there was another statement said by Bandian that supported the claim

www.numerons.in

stated above "boys were twice as like[ly] to be identified by teachers as in need of a learning disability programs [compared to girls]."

In a study 266 youths between the ages of 12-18 were voluntarily interviewed with 74 structured questions in a small classroom, question structure was based on "special education, juvenile justice, and child and adolescent development literature," and then categorized into three parts: personal, home, and school. Based on the information the individuals provided to the interviewers the juvenile delinquents were put into a category, special education, or non-special education.

www.numerons.in

Zabel and Nigro stated that "girls are less often viewed as disruptive and (as having) disturbing behavior patterns that often lead to special education." In contrast to that Zabel and Nigro also found that the "gender pattern was reversed for LD classification, with nearly 78.6% of females who had been in special education" categorized as having a learning disability.

Crime and prison population

Individuals in a detention facility are more likely to have a learning disability, receive poor grades, and repeat a grade. Zabel and Nigro conducted a study with 266 youths (currently in a detention facility), with the youths ages ranging from 12-18. The individuals were voluntarily interviewed with 74 structured questions. Based on the information provided from the individuals, the individuals were categorized into two groups, special education or non-special education. Zabel and Nigro stated "a majority of participants had received failing grades, and many had repeated at least one grade." The researchers also found that 88.6% of the youth had been suspended, and those in the SpEd group were more likely than those in the non-SpEd group to report their first instance of trouble in elementary school. This information provided relates to the factor of when most learning disabled individuals are identified is in elementary school thus proving that it would make sense that the individuals in the SpEd group had their first instance of trouble in elementary school and it is hard for LD individuals to complete the education system, thus resulting in having to rely on welfare and public assistance.

www.numerons.in

Another statistic (calculated from the study stated above) found by Zabel and Nigro was that 37.1% had been involved with special education, and classified having EBD and/or LD. Zabel also found that those individuals with a learning disability were at a higher risk that those with no special education experience (in the violent inmates, 17 of 30 were LD, and in the nonviolent, 13 of 30 were LD).

Individuals in detention facilities may have a learning disability and more specifically have dyslexia (severe difficulty in recognizing and understanding written language, leading to spelling and writing problems). Gretchell, Pabreja, Neeld, and Carrio conducted a study that compared the difference of children with dyslexia and without. Twenty six individuals were dyslexic and 23 individuals were not. Individuals were tested with the Test of Gross Motor Development and Movement Assessment Battery for Children. Individuals with

www.numerons.in

dyslexia performed significantly lower than the control group (individuals who aren't dyslexic).

Youth in a detention facility are more likely to have a special education problem, such as a learning disability, than not. Zabel and Nigro found in their study that

"about one half of SpEd participants and nearly 20% of the total sample reported their classification as learning disabilities."

www.numerons.in

LD individuals make up a large portion of individuals in a detention facility which may have been a result from the LD individual not learning at a significant pace in the education system and also potentially not completing the education system. Zabel and Nigro's study was made up of 266 youth between the ages of 12-18 who were currently in a detention facility.

Contrast with other conditions

People with an IQ lower than 70 are usually characterized as having mental retardation (MR), mental deficiency, or cognitive impairment and are not included under most definitions of learning disabilities, because their learning difficulties are considered to be related directly to their low IQ scores.

Attention-deficit hyperactivity disorder (ADHD) is often studied in connection with learning disabilities, but it is not actually included in the standard definitions of learning disabilities. An individual with ADHD may struggle with learning, but he or she can often learn adequately once successfully treated for the ADHD. A person can have ADHD but not learning disabilities or have learning disabilities without having ADHD. The conditions can co-occur.

www.numerons.in

Some research is beginning to make a case for ADHD being included in the definition of LDs, since it is being shown to have a strong impact on "executive functions" required for learning. This has not as yet affected any official definitions.

Advocacy of the concept of learning disabilities

Rick Lavoie is an advocate, author, special education teacher, and writer of learning disabilities. He started a school in Massachusetts specifically targeted towards learning disabled children. Rick Lavoie has written several books on the subject of learning disabilities and their impact on children. The F.A.T. City Project (1989) was a documentary that created a mock environment where everyday people could experience the Frustration, Anxiety, and Tension of being a learning disabled child.

www.numerons.in

United States and Canada

In the United States and Canada, the terms learning disability and learning disorder (LD) refer to a group of disorders that affect a broad range of academic and functional skills

including the ability to speak, listen, read, write, spell, reason, organize information, and do math. A person's IQ must be average or above to have a learning disability or learning disorder.

USA Legislation related to learning difficulties

The Section 504 of the Rehabilitation Act 1973 was taken in effect in May 1977, this American legislation guarantees certain rights to people with disabilities, especially in the cases of education and work, such being in schools, colleges and university settings.

www.numerons.in

The Individuals with Disabilities Education Act, formerly known as the Education for All Handicapped Children Act, is a United States federal law that governs how states and public agencies provide early intervention, special education and related services to children with disabilities. It addresses the educational needs of children with disabilities from birth to the age of 21. Considered as a civil rights law, states are not required to participate.

United Kingdom

In the UK, terms such as specific learning difficulty (SpLD), Developmental Dyslexia, dyspraxia and dyscalculia are used to cover the range of learning difficulties referred to in the United States as "learning disabilities". In the UK, the term "learning disability" refers to a range of developmental disabilities or conditions that are almost invariably associated with more severe generalized cognitive impairment.

www.numerons.in

Learning Disorders

Dysgraphia

Dysgraphia is a deficiency in the ability to write, primarily in terms of handwriting, but perhaps also in terms of coherence. It occurs regardless of the ability to read and is not due to intellectual impairment. Acquired dysgraphia is known as agraphia.

People with dysgraphia usually can write on some level, and often lack other fine motor skills and may be cross dominant, finding tasks such as tying shoes difficult. It often does not affect all fine motor skills. They can also lack basic grammar and spelling skills (for example, having difficulties with the letters p, q, b, and d), and often will write the wrong word when trying to formulate thoughts (on paper). In childhood, the disorder generally emerges when the child is first introduced to writing. The child may make inappropriately sized and spaced letters, or write wrong or misspelled words despite thorough instruction. Children with the disorder may have other learning disabilities, but they usually have no social or other academic problems. Cases of dysgraphia in adults generally occur after some neurological trauma. Dysgraphia may also be diagnosed in a person with Tourette syndrome, ADHD, learning disability or an autism spectrum disorder such as Asperger syndrome. The DSM IV identifies dysgraphia as a "Disorder of Written Expression" as

www.numerons.in

"writing skills (that) ...are substantially below those expected given the person's ...age, measured intelligence, and age-appropriate education."

Types of dysgraphia

Three principal subtypes of dysgraphia are recognized. Some children may have a combination of two or all three of these, and individual symptoms may vary in presentation from what is described here.

www.numerons.in

Dyslexic dysgraphia

With dyslexic dysgraphia, spontaneously written work is illegible, copied work is fairly good, and spelling is bad. Finger tapping speed (a method for identifying fine motor problems) is normal, indicating the deficit does not likely stem from cerebellar damage. A dyslexic dysgraphic does not necessarily have dyslexia. (Dyslexia and dysgraphia appear to be unrelated but are often found together.)

Motor dysgraphia

Example of motor dysgraphia in a 30-year-old female.

Motor dysgraphia is due to deficient fine motor skills, poor dexterity, poor muscle tone, or unspecified motor clumsiness. Motor dysgraphia may be part of the larger problem of motor apraxia. Generally, written work is poor to illegible, even if copied by sight from another document. Letter formation may be acceptable in very short samples of writing, but this requires extreme effort and an unreasonable amount of time to accomplish, and cannot be sustained for a significant length of time. Writing long passages is extremely painful and cannot be sustained. Letter shape and size becomes increasingly inconsistent and illegible. Writing is often slanted due to holding a pen or pencil incorrectly. Spelling skills are not impaired. Finger tapping speed results are below normal.

www.numerons.in

Spatial dysgraphia

A person with dysgraphia due to a defect in the understanding of space has illegible spontaneously written work, illegible copied work, but normal spelling and normal typing speed.

Symptoms of dysgraphia

A mixture of upper/lower case letters, irregular letter sizes and shapes, unfinished letters, struggle to use writing as a communications tool, odd writing grip, many spelling mistakes (sometimes), pain when writing, decreased or increased speed of writing and copying, talks to self while writing, muscle spasms in the arm and shoulder (sometimes in the rest of the body), inability to flex (sometimes move) the arm (creating an L-like shape), and general illegibility.

www.numerons.in

Many people who are dysgraphic experience pain while writing. The pain usually starts in the center of the forearm and then spreads along the nervous system to the entire body. This pain can get worse or even appear when a dysgraphic is stressed. Few people who do not have dysgraphia know about this, because many with dysgraphia will not mention it to anyone. There are a few reasons why pain while writing is rarely mentioned:

- Sufferers do not know that it is unusual to experience this type of pain with writing.
- If they know that it is different from how others experience writing, they feel that few will believe them.
- Those who do not believe that the pain while writing is real will often not understand it. It will usually be attributed to muscle ache or cramping, and it will often be considered only a minor inconvenience.
- For some people with dysgraphia, they no longer write, and just type everything, so they no longer feel this pain.

Dysgraphics who experience this pain may exhibit reluctance or refusal to complete writing tasks.

Common problems that are often associated with dysgraphia

Stress

There are some common problems not related to dysgraphia but often associated with dysgraphia, the most common of which is stress. Often children (and adults) with dysgraphia will become extremely frustrated with the task of writing (and spelling); younger children may cry, pout, or refuse to complete written assignments. This frustration can cause the child (or adult) a great deal of stress and can lead to stress-related illnesses. This can be a result of any symptom of dysgraphia.

Treatment

Treatment for dysgraphia varies and may include treatment for motor disorders to help control writing movements. Educational therapy, especially neuro-sensory educational therapy, can be effective as it helps to develop proprioception. Other treatments may address impaired memory or other neurological problems. Some physicians recommend that individuals with dysgraphia use computers to avoid the problems of handwriting.

Occupational therapy could be considered to strengthen muscle tone, improve dexterity, and evaluate eye–hand coordination. Dysgraphic children should also be evaluated for ambidexterity, which can delay fine motor skills in early childhood. Diagnosing dysgraphia can be challenging but can be done at facilities specializing in learning disabilities.

www.numerons.in

Nonverbal learning disorder

A nonverbal learning disorder or nonverbal learning disability (NLD or NVLD) is a condition characterized by a significant discrepancy between higher verbal and lower motor, visuo-spatial, and social skills on an IQ test. Some proponents of the category believe that this discrepancy is attributable to dysfunction in the right cerebral hemisphere.

NLD involves deficits in perception, coordination, socialisation, non-verbal problem-solving and understanding of humour, along with well-developed rote memory. As most people with Asperger syndrome (AS) fit the criteria for NLD, a diagnosis of AS is often preferred. In this instance, some researchers assert that an AS diagnosis is more clinically useful than an NLD diagnosis, and argue that NLD would be an example of excessive diagnostic splitting. However, NLD can also occur with other disorders. However, like Asperger syndrome, NLD exists on a spectrum, and those affected can experience it in a range of ways. Those with an NLD diagnosis can experience some or all of the symptoms, and to varying degrees. Ongoing debate surrounds the relationship between Asperger syndrome and NLD, as research on the condition is ongoing and procedures can differ from AS research.

www.numerons.in

Symptoms

Non-verbal communication

People with this disability may misunderstand non-verbal communications, or they may understand the communications but be unable to formulate an appropriate response. This can make establishing and maintaining social contacts difficult. Eye contact can also be difficult for people with NLD, either because they are uncomfortable with maintaining it or because they do not remember that others expect it. Similarly, knowing when and how to use physical contact and recognizing emotions in others and expressing them for oneself can be problematic.

www.numerons.in

Verbal communication

People with NLD will often tend to lapse into "cocktail-speech," talking too much and too quickly. People with NLD have strong verbal communication skills and must often rely on verbal communication as their main method of gathering information. Trying to process too many non-verbal stimuli can confuse them.

People with NLD often have strong verbal skills, and learn how to use those to compensate.

Numerical and spatial awareness

www.numerons.in

Arithmetic and mathematics can be very difficult for people with NLD, and they often have problems with spatial awareness. Problematic areas may include:

- Recognizing faces
- Paying attention in noisy environments
- Navigation

- In mathematics: the confusion of X-axis and Y-axis
- Remembering the names and locations of places
- Map reading, or plotting or remembering routes. People with NLD are often best-served by giving landmarks along with repeated directions.
- Estimating the speed of cars while crossing the road
- Self-awareness of where their body is(frequently bump into other people and objects)
- Backing out a car

www.numerons.in

Motor

People with NLD often have motor difficulties. This can manifest in their walking and running, which are sometimes stiff, or in difficulty balancing. They may also be more likely to run into things, due to judging distances poorly. Fine motor skills can also develop abnormally, causing difficulty with writing, drawing, and tying shoelaces. NLD sufferers are often labeled as "clumsy" or "stiff".

Anxiety

People with NLD, more than many others, fear failure. They may feel that they have to do too much at once, and then do not know where to start. This allows them to stagnate, and then do nothing. Sometimes they try to multitask and again end up doing nothing, which can lead to frustration. They may experience the world around them as a chaos, the actions that they must perform well and quickly creating a sense of helplessness. Clumsiness in performing tasks may be criticized by teachers or in the workplace, causing further fear of failure.

www.numerons.in

There is a high incidence of suicide in the NLD population.

Auditory processing disorder

Auditory Processing Disorder (APD), also known as (Central) Auditory Processing Disorder ((C)APD) is an umbrella term for a variety of disorders that affect the way the brain processes auditory information. It is not a sensory (inner ear) hearing impairment; individuals with APD usually have normal peripheral hearing ability. However, they cannot process the information they hear in the same way as others do, which leads to difficulties in recognizing and interpreting sounds, especially the sounds composing speech.

APD can affect both children and adults. Approximately 2-3% of children and 17-20% of adults have this disorder. Males are two times more likely to be affected by the disorder than females.

www.numerons.in

Definitions

The American Speech-Language-Hearing Association (ASHA) published "(Central) Auditory Processing Disorders" in January 2005 as an update to the "Central Auditory Processing: Current Status of Research and Implications for Clinical Practice (ASHA, 1996)", complementing the UK's Medical Research Council's Auditory Processing Disorder (APD) pamphlet, Oct 2004.

Auditory processing disorder can be genetic or acquired. It may result from ear infections, head injuries or developmental delays that cause central nervous system difficulties that affect processing of auditory information. This can include problems with: "...sound localization and lateralization (see also binaural fusion); auditory discrimination; auditory pattern recognition; temporal aspects of audition, including temporal integration, temporal discrimination (e.g., temporal gap detection), temporal ordering, and temporal masking; auditory performance in competing acoustic signals (including dichotic listening); and auditory performance with degraded acoustic signals."

www.numerons.in

The Committee of UK Medical Professionals Steering the UK Auditory Processing Disorder Research Program have developed the following working definition of Auditory Processing Disorder:

"APD results from impaired neural function and is characterized by poor recognition, discrimination, separation, grouping, localization, or ordering of speech sounds. It does not solely result from a deficit in general attention, language or other cognitive processes."

Diagnosis

www.numerons.in

As APD is one of the more difficult information processing disorders to detect and diagnose, it may sometimes be misdiagnosed as ADD/ADHD, Asperger syndrome and other forms of autism, but it may also be a comorbid aspect of those conditions if it is considered a significant part of the overall diagnostic picture. APD shares common symptoms in areas of overlap, such that professionals unfamiliar with APD might misdiagnose it as a condition they are aware of.

People with APD intermittently experience an inability to process verbal information. When people with APD have a processing failure, they do not process what is being said to them.

There are also many other hidden implications, which are not always apparent even to the person with the disability. For example, because people with APD are used to guessing to fill in the processing gaps, they may not even be aware that they have misunderstood something.

www.numerons.in

APD has been defined anatomically in terms of the integrity of the auditory nervous system, as "what we do with what we hear", and in terms of performances on a selected group of behavioral auditory tests (Task Force for the American Speech, Language, and Hearing Association; ASHA, 1994). The ASHA Task Force definition considered APD to be any observed deficits in one or more of these so-called "behaviors". Problems inherent in test validation by consensus are highlighted by the succession of task force reports that

have appeared in recent years. The first of these occurred in 1996. This was followed by a conference organized by the American Academy of Audiology that explicitly embraced modality specificity as a defining characteristic of auditory processing disorders. Subsequently, an ASHA committee rejected modality specificity as a defining characteristic of auditory processing disorders.

There have been several commentaries questioning various aspects of these proposals. Additionally, Moore suggests that APD is primarily a difficulty in processing non-speech sounds and that a population-based approach should be taken to identify outlying performers. However, inclusive conceptualizations of APD have been criticized based on their lack of diagnostic specificity. Auditory processing disorder has been defined as a modality specific perceptual dysfunction that is not due to peripheral hearing loss. This viewpoint emphasizes the perceptual nature of auditory processing and asserts that the disorder should be conceptualized as being limited to problems in processing auditory material. Modality specificity has been advocated as a way to improve APD diagnosis. There are several limitations to the approach suggested by proponents of modality specificity testing, including: major differences between primary auditory and visual cortices in the way information is coded and processed, how such approaches would separate children with both visual and auditory processing deficits from children with supramodal deficits, cross modal test equivalence, clinical infeasibility of visual processing test administration, lack of appropriate visual analogs to be used by audiologists, redundancy of modality specificity testing with neuropsychological assessment, and non-modularity of the central nervous system, among others.

www.numerons.in

Causes

The causes of APD are unknown. There is anecdotal evidence to suggest links to autistic spectrum disorder, dyslexia, middle ear infections and lack of oxygen at birth, as well as occurring in association with aniridia, (due to a PAX6 mutation) among other conditions.

Characteristics

The National Institute on Deafness and Other Communication Disorders is the author of "Auditory Processing Disorder in Children". The National Institute on Deafness and Other Communication Disorders. Facilities, such as The Lewis School of Princeton, have specialists that can assist in determining the presence of this disorder. They state that children with Auditory Processing Disorder often:

- have trouble paying attention to and remembering information presented orally, and may cope better with visually acquired information
- have problems carrying out multi-step directions given orally; need to hear only one direction at a time
- have poor listening skills
- need more time to process information
- have low academic performance
- have behavior problems

www.numerons.in

- have language difficulties (e.g., they confuse syllable sequences and have problems developing vocabulary and understanding language)
- have difficulty with reading, comprehension, spelling, and vocabulary

Other characteristics may include:

- needing people to speak slowly
- disliking locations with background noise such as bar, clubs or other social locations
- a preference for written communication (e.g. text chat)
- having trouble paying attention and remembering information when information is simultaneously presented in multiple modalities

www.numerons.in

APD can manifest as problems determining the direction of sounds, difficulty perceiving differences between speech sounds and the sequencing of these sounds into meaningful words, confusing similar sounds such as "hat" with "bat", "there" with "where", etc. Fewer words may be perceived than were actually said, as there can be problems detecting the gaps between words, creating the sense that someone is speaking unfamiliar or nonsense words. Those suffering from APD may have problems relating what has been said with its meaning, despite obvious recognition that a word has been said, as well as repetition of the word. Background noise, such as the sound of a radio, television or a noisy bar can make it difficult to impossible to understand speech, depending on the severity of the auditory processing disorder. Using a telephone can be problematic for someone with auditory processing disorder, in comparison with someone with normal auditory processing, due to low quality audio, poor signal, intermittent sounds and the chopping of words. Many who have auditory processing disorder subconsciously develop visual coping strategies, such as lip reading, reading body language, and eye contact, to compensate for their auditory deficit, and these coping strategies are not available when using a telephone.

www.numerons.in

Secondary characteristics

APD shares some of these signs with related disorders, which may have other overlap areas, such as acquired brain injury, attention deficits, dyslexia, learning difficulties, hearing loss, and psychologically-based behavioral problems.

APD may be related to cluttering, a fluency disorder marked by word and phrase repetitions.

Remediations and training

www.numerons.in

Recent research has shown that practice with basic auditory processing tasks (i.e. auditory training) may improve performance on auditory processing measures and phonemic awareness measures (Moore et al., 2005). These auditory training benefits have also been recorded at the physiological level (Russo et al., 2005; Alonso & Schochat, 2009). Many of these tasks are incorporated into computer based auditory training programs such as

Earobics and Fast ForWord, an adaptive software available at home and in clinics worldwide.

There is no research supporting the following APD treatments:

- Auditory Integration Training typically involves a child attending two 30-minute sessions per day for ten days.
- Lindamood-Bell Learning Processes (particularly, the Visualizing and Verbalizing program)
- Physical activities that require frequent crossing of the midline (e.g., occupational therapy)
- Sound Field Amplification
- Neuro-Sensory Educational Therapy

www.numerons.in

Relation to Specific language impairment

APD can also be confused with Specific language impairment (SLI).

SLI is more specifically a problem associated with the linking of words, both written and spoken, to semantics (meaning) and someone can have both APD and SLI. Unlike those with SLI, those with APD can usually get the meaning of language from written words where those with SLI show problems with both heard and read words, demonstrating that the basic issue is not an auditory one.

www.numerons.in

Those with APD have auditory difficulty distinguishing sounds including speech from extraneous sounds, e.g. fans or other chatter. APD is purely about processing what you hear both verbal and non-verbal. For those who have SLI, difficulty processing verbal language is only one of many symptoms.

Language-based learning disability

Language-based learning disabilities or LBLD are "heterogeneous" disorders associated with young children that affect their academic skills such as listening, reasoning speaking, reading, writing, and math calculations. It is also associated with movement, coordination, and direct attention. LBLD is not usually identified until the child reaches school age. Most of the children with this disorder find it hard to communicate, to express ideas efficiently and whatever they say can be ambiguous and hard to understand It is caused by brain damage or a structural development of brain usually at birth. It is often hereditary, and is frequently associated to specific language problems.
There are two types of learning disabilities: non-verbal, which includes disabilities from psychomotor difficulties to dyscalculia, and verbal, language based.

www.numerons.in

Symptoms

Symptoms of LBLD can be complex or simple according to the severity of risk factors. It consists of dyslexia which comprises the reading of numbers sequentially, learning the time table, and telling time There are also difficulties associated with written language such as trouble learning new vocabulary, letters and alphabets. Trouble understanding questions and following directions, understanding and remembering the details of a story's plot or a classroom lecture, learning words to songs and rhymes, telling left from right, and having a hard time with reading and writing . Difficulties associated with reading and spoken language involve trouble understanding questions and following directions, understanding and retaining the details of a story's plot or a classroom lecture, nonword repetition, learning words to songs and rhymes, and identifying the sounds that correspond to letters, which makes learning to read difficult Difficulties associated with motor skills include difficulty telling left from right which is part of motor incoordination, visual perceptual problems, and memory problem.

www.numerons.in

Prevalence

15-20% of the children in the United States have a language-based learning disability. Of the students with specific learning disabilities receiving special education services, 70-80% have a discrepancy in reading.

Diagnosis

A speech-language pathologist (SLP), psychologist, social worker, and sometimes neurologist work together or individually to find the proper diagnosis for children with LBLD. Additionally, they evaluate speaking, listening, reading, and written language for children who have LBLD.

www.numerons.in

- SLPs evaluate the child's comprehension skills, and the child's ability to follow verbal and written directions. Also, they look for responsiveness, and see if the child recognizes familiar signs or holds a book correctly and they look for whether the child knows and/or writes letters, and names.
- Social workers obtain literacy history from the home, and then observe the child during classroom activities, they look for social interactions.
- Psychologists review a child's phonological memory by having him or her repeat series of words, numbers, letters, and sounds. They also look for response from the child to environmental and social factors.
- Neurologists look for motor skills, brain functions which include visual and auditory perception.

Prognosis

www.numerons.in

LBLD can be enduring situation. Some people might experience overlapping learning disabilities that makes them less likely to have improvement results. Others with single learning problems that don't impact their life very much have more improvement. Most of them can balance and achieve literacy, but as they grow old, they become weak in work, social and psychological changes.

Treatment

Special education classes are the primary treatment. These classes focus on activities that sustain growth in language skills. The foundation of this treatment is repetition of oral, reading and writing activities. Usually the SLP, psychologist and the teacher work together with the children in small groups in the class room. Another treatment is looking at a child's needs through the Individual Education Plan (IEP). In this program teachers and parents work together to monitor the progress of the child's comprehensive, verbal, written, social, and motor skills in school and in the home. Then the child goes through different assessments to determine his/her level. The level that the child is placed in will determine the class size, number of teachers, and the need for therapy. There are a number of schools that cater specifically to students with language-based learning disabilities such as Landmark School in Massachusetts.

www.numerons.in

Primary and secondary gain

Primary gain or secondary gain are used in medicine to describe the significant psychological motivators patients may have in reporting symptoms.

Primary gain produces positive internal motivations. For example, a patient might feel guilty about being unable to perform some task. If he has a medical condition justifying his inability, he might not feel so bad. Primary gain can be a component of any disease, but is most dramatically demonstrated in conversion disorder (a psychiatric disorder in which stressors manifest themselves as physical symptoms without organic causes, such as a person who becomes blindly inactive after seeing a murder). The "gain" may not be particularly evident to an outside observer.

www.numerons.in

Secondary gain can also be a component of any disease, but is an external motivator. If a patient's disease allows him/her to miss work, gains him/her sympathy, or avoids a jail sentence, these would be examples of secondary gain. These may, but need not be, recognized by the patient. If he/she is deliberately exaggerating symptoms for personal gain, then he/she is malingering. However, secondary gain may simply be an unconscious psychological component of symptoms and other personalities. In the context of a person with a significant mental or psychiatric disability, this effect is sometimes called secondary handicap.

Tertiary gain, a less well-studied process, is when a third party such as a relative or friend is motivated to gain sympathy or other benefits from the illness of the victim.

www.numerons.in

Disorder of written expression

Disorder of written expression is a childhood condition characterized by poor writing skills. To some extent, 3 - 10% of school-age children are affected by this disorder. This

disorder appears by itself or in conjunction with other learning or developmental disabilities.

Symptoms

- Avoids written work.
- Poor spelling
- Errors in grammar
- Errors in punctuation
- Poor handwriting
- Composition is poor relative to oral expression skills; uses simple vocabulary to avoid spelling difficulty.

www.numerons.in

This is not solely a childhood disability. It continues on into adulthood.

Assessments

- Oral and Written Language Scales (OWLS)
- Test of Adolescent and Adult Language–3 (TOAL-3)
- Test of Early Written Language
- Test of Written Expression (TOWE)
- Test of Written Language–3 (TOWL-3)
- Woodcock Johnson Psychoeducational Battery–Revised, Tests of Achievement
- Weschler Individual Achievement Test (WIAT)

www.numerons.in

Reading disability

A reading disability is a condition in which a sufferer displays difficulty reading resulting primarily from neurological factors. Developmental Dyslexia, Alexia (acquired dyslexia), and Hyperlexia.

Definition

National Institute of Neurological Disorders and Stroke defines reading disability or dyslexia as follows: "Dyslexia is a brain-based type of learning disability that specifically impairs a person's ability to read. These individuals typically read at levels significantly lower than expected despite having normal intelligence. Although the disorder varies from person to person, common characteristics among people with dyslexia are difficulty with spelling, phonological processing (the manipulation of sounds), and/or rapid visual-verbal responding. In adults, dyslexia usually occurs after a brain injury or in the context of dementia. It can also be inherited in some families, and recent studies have identified a number of genes that may predispose an individual to developing dyslexia."

www.numerons.in

Reading disabilities

Dyslexia

Dyslexia is a learning disability that manifests itself as a difficulty with reading decoding, reading comprehension and/or reading fluency. It is separate and distinct from reading difficulties resulting from other causes, such as a non-neurological deficiency with vision or hearing, or from poor or inadequate reading instruction. It is estimated that dyslexia affects between 5-17% of the population. Dyslexia has been proposed to have three cognitive subtypes: auditory, visual and attentional. Although not an intellectual disability, it is considered both a learning disability and a reading disability. Dyslexia and IQ are not interrelated, since reading and cognition develop independently in individuals who have dyslexia.

www.numerons.in

Hyperlexia

Hyperlexic children are characterized by having average or above average IQs and word-reading ability well above what would be expected given their ages and IQs. Hyperlexia can be viewed as a superability in which word recognition ability goes far above expected levels of skill. Some hyperlexics, however, have trouble understanding speech. Most or perhaps all children with hyperlexia lie on the autism spectrum. Between 5-10% of autistic children have been estimated to be hyperlexic.

Expressive language disorder

Expressive language disorder is a communication disorder in which there are difficulties with verbal and written expression. It is a specific language impairment characterized by an ability to use expressive spoken language that is markedly below the appropriate level for the mental age, but with a language comprehension that is within normal limits. There can be problems with vocabulary, producing complex sentences, and remembering words, and there may or may not be abnormalities in articulation.

www.numerons.in

As well as present speech production, very often, someone will have difficulty remembering things. This memory problem is only disturbing for speech; non-verbal or non-linguistically based memory will be unimpaired.

Expressive language disorder affects work and schooling in many ways. It is usually treated by specific speech therapy, and usually cannot be expected to go away on its own.

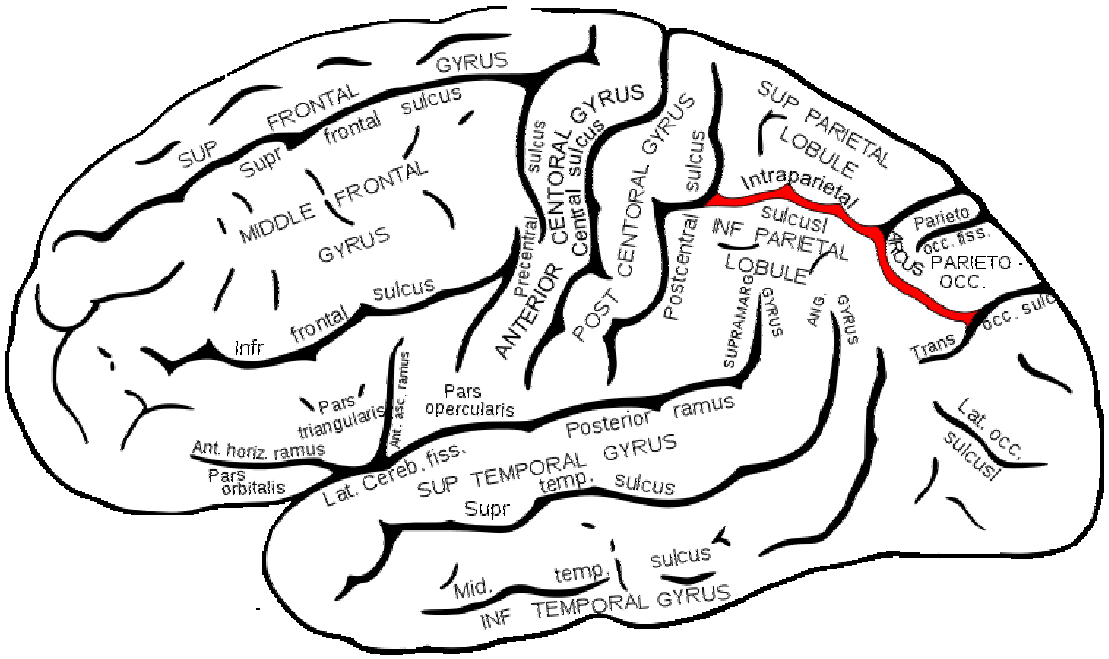
Care must be taken to distinguish expressive language disorder from other communication disorders, sensory-motor disturbances, intellectual disability and/or environmental deprivation (see DSM-IV-TR criterion D). These factors affect a person's speech and writing to certain predictable extents, and with certain differences.

www.numerons.in

Dyscalculia

Dyscalculia (or math disability) is a specific learning disability involving innate difficulty in learning or comprehending simple mathematics. It is akin to dyslexia and includes difficulty in understanding numbers, learning how to manipulate numbers, learning math facts, and a number of other related symptoms (although there is no exact form of the disability). Math disabilities can also occur as the result of some types of brain injury, in which case the proper term is acalculia, to distinguish it from dyscalculia which is of innate, genetic or developmental origin.

www.numerons.in



Lateral surface of left cerebral hemisphere, viewed from the side. (Intraparietal sulcus visible at upper right, running horizontally.)

Although math learning difficulties occur in children with low IQ dyscalculia can also be found in people with normal to superior intelligence. Estimates of the prevalence of dyscalculia range between 3 and 6% of the population.

History

The term dates back to at least 1974.

www.numerons.in

Mental disabilities specific to math were originally identified in case studies with patients who suffered specific arithmetic disabilities as a result of damage to specific regions of the brain. More commonly, dyscalculia occurs developmentally, as a genetically-linked learning disability which affects a person's ability to understand, remember, or manipulate numbers

or number facts (e.g., the multiplication tables). The term is often used to refer specifically to the inability to perform arithmetic operations, but it is also defined by some educational professionals and cognitive psychologists such as Stanislas Dehaene and Brian Butterworth as a more fundamental inability to conceptualize numbers as abstract concepts of comparative quantities (a deficit in "number sense"), which these researchers consider to be a foundational skill, upon which other math abilities build.

Etymology

www.numerons.in

Dyscalculia comes from Greek and Latin which means: "counting badly". The prefix "dys" comes from Greek and means "badly". "Calculia" comes from the Latin "calculare," which means "to count". The word "calculare" comes from "calculus", which means "pebble" or one of the counters on an abacus.

Symptoms

The earliest symptom of dyscalculia to appear is a deficit in subitizing. Subitizing is the ability to know, from a brief glance and without counting, how many objects there are in a small group. This is an innate ability, present in human infants from birth. Homologous circuits exist in primates, and many other animals have been shown to possess similar ability; obviously, there is survival value in knowing how many predators there are, etc. Human infants can typically subitize three objects, and this number grows as the person matures, so that most adults can subitize 5 or more objects. However, children with dyscalculia can subitize fewer objects and even when correct take longer to identify the number than their age-matched peers.

www.numerons.in

Causes

Scientists have yet to understand the causes of dyscalculia. They have been investigating in several domains.

- Neurological: Dyscalculia has been associated with lesions to the supramarginal and angular gyri at the junction between the temporal and parietal lobes of the cerebral cortex.

- Deficits in working memory: Adams and Hitch argue that working memory is a major factor in mental addition. From this base, Geary conducted a study that suggested there was a working memory deficit for those who suffered from dyscalculia. However, working memory problems are confounded with general learning difficulties, thus Geary's findings may not be specific to dyscalculia but rather may reflect a greater learning deficit.

www.numerons.in

Other causes may be:

- Short term memory being disturbed or reduced, making it difficult to remember calculations.

- Congenital or hereditary disorders. Studies show indications of this, but the evidence is not yet concrete.

Gerstmann syndrome: dyscalculia is one of a constellation of symptoms acquired after damage to the angular gyrus.

Involvement of the intraparietal sulcus has been suggested.

www.numerons.in

Treatment

Some people with Dyscalculia have advocated a shift in attitudes toward the view that it is a difference, rather than a disability that must be treated or cured if they show talent in other areas - such as art skills.

Software intended to remediate dyscalculia has been developed.

Forms of educational therapy, such as neuro-sensory educational therapy, can be an effective treatment.

A study published in Current Biology to "investigate the feasibility of using noninvasive stimulation to the parietal lobe during numerical learning to selectively improve numerical abilities" used transcranial direct current stimulation (TDCS) and demonstrated improvement that was still present six months later.

www.numerons.in

Acalculia

Acalculia (not to be confused with dyscalculia) is an acquired impairment in which patients have difficulty performing simple mathematical tasks, such as adding, subtracting, multiplying and even simply stating which of two numbers is larger. Acalculia is distinguished from dyscalculia in that acalculia is acquired late in life due to neurological injury such as stroke, while dyscalculia is a specific developmental disorder first observed during the acquisition of mathematical knowledge. The name comes from the Greek "a" meaning "not" and Latin "calculare", which means "to count".

Variations

Acalculia is associated with lesions of the parietal lobe (especially the angular gyrus) and the frontal lobe and can be an early sign of dementia. Acalculia is sometimes observed as a "pure" deficit, but is commonly observed as one of a constellation of symptoms, including agraphia, finger agnosia and left-right confusion, after damage to the left angular gyrus, known as Gerstmann's syndrome (Gerstmann, 1940; Mayer et al., 1999).

www.numerons.in

Studies of patients with lesions to the parietal lobe have demonstrated that lesions to the angular gyrus tend to lead to greater impairments in memorized mathematical facts, such as multiplication tables, with relatively unimpaired subtraction abilities. Conversely,

patients with lesions in the region of the intraparietal sulcus tend to have greater deficits in subtraction, with preserved multiplication abilities (Dehaene and Cohen, 1997). These double dissociations lend support to the idea that different regions of the parietal cortex are involved in different aspects of numerical processing.

Ageometresia

Ageometresia or ageometria is a word describing a defect in a work of geometry.

www.numerons.in

An early usage of the word was in writings of François Viète on Copernicus. As another instance, Johannes Kepler, having no direct and geometrical method of finding certain matters in his elliptical theory, namely how to calculate the true anomaly from the mean anomaly, has been charged by others with ageometresia.

Although Viète wrote in Latin, the word "ageometresia" is Greek, and the same Greek word has also subsequently been used by writers in English. As well as its usage to indicate faults in the works of professional mathematicians, "ageometria" has also been used to describe a form of dyscalculia, a disability that prevents students from understanding geometry.

Developmental dyspraxia

Developmental dyspraxia is a motor learning difficulty that can affect planning of movements and co-ordination as a result of brain messages not being accurately transmitted to the body. It may be diagnosed in the absence of other motor or sensory impairments like cerebral palsy, muscular dystrophy, multiple sclerosis or Parkinson's disease.

www.numerons.in

Terminology

Dyspraxia is a specific learning difficulty (SpLD) so it does not affect overall intelligence or ability, but just affects particular aspects of development. The concept of developmental dyspraxia has existed for more than a century, but differing interpretations of the terminology remains.

The Dyspraxia Foundation defines developmental dyspraxia as "an impairment or immaturity of the organisation of movement. It is an immaturity in the way that the brain processes information, which results in messages not being properly or fully transmitted. The term dyspraxia comes from the word praxis, which means 'doing, acting'. Dyspraxia affects the planning of what to do and how to do it. It is associated with problems of perception, language and thought". Dyspraxia is described as having two main elements:

www.numerons.in

- Ideational dyspraxia: difficulty with planning a sequence of coordinated movements.
- Ideo-Motor dyspraxia: difficulty with executing a plan, even though it is known.

Ripley, Daines, and Barrett state that "Developmental dyspraxia is difficulty getting our bodies to do what we want when we want them to do it", and that this difficulty can be considered significant when it interferes with the normal range of activities expected for a child of their age. The word "dyspraxia" comes from the Greek words "dys" meaning impaired or abnormal and "praxis", meaning action or deed.

Epidemiology

www.numerons.in

Developmental dyspraxia (referred to as developmental coordination disorder (DCD) in the US and Europe) is a life-long condition that is more common in males than in females, with a ratio of approximately four males to every female. The exact proportion of people with the disorder is unknown since the disorder can be difficult to detect due to a lack of specific laboratory tests, thus making diagnosis of the condition one of elimination of all other possible causes/diseases. Current estimates range from 5%–20% with 5–6% being the most frequently quoted percentage in the literature.

Assessment and diagnosis

Assessments for dyspraxia typically require a developmental history, detailing ages at which significant developmental milestones, such as crawling and walking, occurred. Motor skills screening includes activities designed to indicate dyspraxia, including balancing, physical sequencing, touch sensitivity, and variations on walking activities. A baseline motor assessment establishes the starting point for developmental intervention programs. Comparing children to normal rates of development may help to establish areas of significant difficulty.

www.numerons.in

However, research in the British Journal of Special Education has shown that knowledge is severely limited in many who should be trained to recognise and respond to various difficulties, including Developmental Coordination Disorder, Dyslexia and DAMP. The earlier that difficulties are noted and timely assessments occur, the quicker intervention can begin. A teacher or GP could miss a diagnosis if they are only applying a cursory knowledge.

"Teachers will not be able to recognise or accommodate the child with learning difficulties in class if their knowledge is limited. Similarly GPs will find it difficult to detect and appropriately refer children with learning difficulties."

Developmental profiles

Various areas of development can be affected by developmental dyspraxia and these will persist into adulthood, as dyspraxia has no cure. Often various coping strategies are developed, and these can be enhanced through occupational therapy, physiotherapy, speech therapy, or psychological training.

www.numerons.in

Speech and language

Developmental verbal dyspraxia is a type of ideational dyspraxia, causing linguistic or phonological impairment. This is the favoured term in the UK; however it is also sometimes referred to as articulatory dyspraxia and in the United States the usual term is childhood apraxia of speech (CAS). Key problems include:

- Difficulties controlling the speech organs.
- Difficulties making speech sounds
- Difficulty sequencing sounds
  - Within a word
  - Forming words into sentences
- Difficulty controlling breathing and phonation.
- Slow language development.
- Difficulty with feeding.

www.numerons.in

Fine motor control

Difficulties with fine motor co-ordination lead to problems with handwriting, which may be due to either ideational or ideo-motor difficulties. Problems associated with this area may include:

- Learning basic movement patterns.
- Developing a desired writing speed.
- The acquisition of graphemes – e.g. the letters of the Latin alphabet, as well as numbers.
- Establishing the correct pencil grip
- Hand aching while writing

www.numerons.in

Fine-motor problems can also cause difficulty with a wide variety of other tasks such as using a knife and fork, fastening buttons and shoelaces, cooking, brushing one's teeth, applying cosmetics, styling one's hair, opening jars and packets, locking and unlocking doors, shaving and doing housework.

Whole body movement, coordination, and body image

Issues with gross motor coordination mean that major developmental targets including walking, running, climbing and jumping can be affected. The difficulties vary from child to child and can include the following:

- Poor timing.
- Poor balance (sometimes even falling over in mid-step). Tripping over one's own feet is also common.
- Difficulty combining movements into a controlled sequence.
- Difficulty remembering the next movement in a sequence.
- Problems with spatial awareness, or proprioception.

www.numerons.in

- Some people with dyspraxia have trouble picking up and holding onto simple objects such as picking pencils and things up, owing to poor muscle tone and or proprioception.
- This disorder can cause an individual to be clumsy to the point of knocking things over and bumping into people accidentally.
- Some people with dyspraxia have difficulty in determining left from right.
- Cross-laterality, ambidexterity, and a shift in the preferred hand are also common in people with dyspraxia.
- People with dyspraxia may also have trouble determining the distance between them and other objects.

www.numerons.in

General difficulties

In addition to the physical impairments, dyspraxia is associated with problems with memory, especially short-term memory. This typically results in difficulty remembering instructions, difficulty organizing one's time and remembering deadlines, increased propensity to lose things or problems carrying out tasks which require remembering several steps in sequence (such as cooking.) Whilst most of the general population experience these problems to some extent, they have a much more significant impact on the lives of dyspraxic people. However, many dyspraxics have excellent long-term memories, despite poor short-term memory. Many dyspraxics benefit from working in a structured environment, as repeating the same routine minimises difficulty with time-management and allows them to commit procedures to long-term memory.

www.numerons.in

People with dyspraxia may have sensory integration dysfunction, including abnormal oversensitivity or undersensitivity to physical stimuli, such as touch, light, and sound. This may manifest itself as an inability to tolerate certain textures such as sandpaper or certain fabrics and including oral toleration of excessively textured food (commonly known as picky eating), or even being touched by another individual (in the case of touch oversensitivity) or may require the consistent use of sunglasses outdoors since sunlight may be intense enough to cause discomfort to a dyspraxic (in the case of light oversensitivity). An aversion to loud music and naturally loud environments (such as clubs and bars) is typical behavior of a dyspraxic individual who suffers from auditory oversensitivity, while only being comfortable in unusually warm or cold environments is typical of a dyspraxic with temperature oversensitivity. Undersensitivity to stimuli may also cause problems. Dyspraxics who are undersensitive to pain may injure themselves without realising. Some dyspraxics may be oversensitive to some stimuli and undersensitive to others. These are commonly associated with autism spectrum conditions.

www.numerons.in

People with dyspraxia sometimes have difficulty moderating the amount of sensory information that their body is constantly sending them, so as a result these people are prone to panic attacks. Having other autistic traits (which is common with dyspraxia and related conditions) may also contribute to sensory-induced panic attacks.

Dyspraxia can cause problems with perception of distance, and with the speed of moving objects and people This can cause problems moving in crowded places and crossing roads and can make learning to drive a car extremely difficult or impossible.

Many dyspraxics struggle to distinguish left from right, even as adults, and have extremely poor sense of direction generally.

Moderate to extreme difficulty doing physical tasks is experienced by some dyspraxics, and fatigue is common because so much extra energy is expended while trying to execute physical movements correctly. Some (but not all) dyspraxics suffer from hypotonia, which in this case is chronically low muscle tone caused by dyspraxia. People with this condition can have very low muscle strength and endurance (even in comparison with other dyspraxics) and even the simplest physical activities may quickly cause soreness and fatigue, depending on the severity of the hypotonia. Hypotonia may worsen a dyspraxic's already poor balance.

www.numerons.in

Overlap with other conditions

Dyspraxics may have other difficulties that are not due to dyspraxia itself but often co-exist with it. This is sometimes referred to as comorbidity. Dyspraxics may have characteristics of dyslexia (difficulty with reading and spelling), dyscalculia (difficulty with mathematics), dysgraphia (an inability to write neatly and/or draw) expressive language disorder (difficulty with verbal expression), ADHD (poor attention span and impulsive behaviour), or Asperger syndrome (consisting variously of poor social cognition, a literal understanding of language [making it hard to understand idioms or sarcasm] and rigid, intense interests). However, they are unlikely to have problems in all of these areas. The pattern of difficulty varies widely from person to person, and it is important to understand that a major weakness for one dyspraxic can be a strength or gift for another. For example, while some dyspraxics have difficulty with reading and spelling due to an overlap with dyslexia, or numeracy due to an overlap with dyscalculia, others may have brilliant reading and spelling or mathematical abilities. Similarly, some have autistic traits such as lacking an appreciation of irony or social cues, while others thrive on an ironic sense of humour as a bonding tool and a means of coping.

www.numerons.in

Students with Dyspraxia struggle most in visual-spatial memory. When compared to their peers who don’t have motor difficulties, students with dyspraxia are seven times more likely than typically developing students to achieve very poor scores in visual-spatial memory. As a result of this working memory impairment, students with dyspraxia have learning deficits as well.

Students with dyspraxia can also have comorbid language impairments (SLI). Research has found that students with dyspraxia and normal language skills still experience learning difficulties despite relative strengths in language. This means that for students with dyspraxia their working memory abilities determine their learning difficulties. Any strength in language that they have is not able to sufficiently support their learning.

Other names

Collier first described developmental dyspraxia as 'congenital maladroitness'. A. Jean Ayres referred to it as a disorder of sensory integration in 1972 while in 1975 Dr Sasson Gubbay called it the 'clumsy child syndrome'. It has also been called minimal brain dysfunction although the two latter names are no longer in use. Other names include:

- Dyspraxia
- Developmental Co-ordination Disorder (DCD) - a subtly different condition by definition, in practice, very similar.
- Sensorimotor dysfunction
- Perceptuo-motor dysfunction
- Motor Learning Difficulties

www.numerons.in

The World Health Organisation currently lists Developmental Dyspraxia as Specific Developmental Disorder of Motor Function.

Notable dyspraxics

Living people who have publicly stated they have been diagnosed with dyspraxia include actor Daniel Radcliffe, photographer David Bailey, Florence Welch from Florence and the Machine and actress Hannah McDonnell.

It is difficult to ascertain whether someone now deceased, who was not diagnosed in his/her lifetime, was dyspraxic or not. However, some deceased people suspected to have been dyspraxic include physicist Albert Einstein (although this is subject to some debate, as some have argued that he may have had Asperger's Syndrome, and others speculating that he had both of these conditions).

www.numerons.in

Writers suspected to have had the condition include Emily Bronte, Charlotte Bronte, poet Samuel Taylor Coleridge, G.K. Chesterton, Ernest Hemingway, Jack Kerouac and George Orwell.

Helen Burns, a character from Charlotte Bronte's Jane Eyre, is alleged to have been based on the author's dyspraxic elder sister Maria Bronte.

Dyslexia

Dyslexia is a broad term defining a learning disability that impairs a person's fluency or comprehension accuracy in being able to read, and spell, and which can manifest itself as a difficulty with phonological awareness, phonological decoding, orthographic coding, auditory short-term memory, and/or rapid naming. Dyslexia is separate and distinct from reading difficulties resulting from other causes, such as a non-neurological deficiency with vision or hearing, or from poor or inadequate reading instruction. It is believed that

www.numerons.in

dyslexia can affect between 5 to 10 percent of a given population although there have been no studies to indicate an accurate percentage.

There are three proposed cognitive subtypes of dyslexia: auditory, visual and attentional. Reading disabilities, or dyslexia, is the most common learning disability, although in research literature it's considered to be a receptive language-based learning disability.

Accomplished adult dyslexics may be able to read with good comprehension, but they tend to read more slowly than non-dyslexics and may perform more poorly at nonsense word reading (a measure of phonological awareness) and spelling. Dyslexia is not an intellectual disability, since dyslexia and IQ are not interrelated as a result of cognition developing independently.

www.numerons.in

Classification

Spoken language is a universal form of human oral communication. The visual notation of speech—written language—is not found in all cultures and is a recent development with regard to human evolution.

There are many definitions of dyslexia but no official consensus has been reached.

The World Federation of Neurology defines dyslexia as "a disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence and sociocultural opportunity".

www.numerons.in

MedlinePlus and the National Institutes of Health define dyslexia as "a reading disability resulting from the inability to process graphic symbols".

The National Institute of Neurological Disorders and Stroke gives the following definition for dyslexia:

"Dyslexia is a brain-based type of learning disability that specifically impairs a person's ability to read. These individuals typically read at levels significantly lower than expected despite having normal intelligence. Although the disorder varies from person to person, common characteristics among people with dyslexia are difficulty with spelling, phonological processing (the manipulation of sounds), and/or rapid visual-verbal responding. In adults, dyslexia usually occurs after a brain injury or in the context of dementia. It can also be inherited in some families and so on, and recent studies have identified a number of genes that may predispose an individual to developing dyslexia".

www.numerons.in

Other published definitions are purely descriptive or embody causal theories. Varying definitions are used for dyslexia from researchers and organizations around the world; it appears that this disorder encompasses a number of reading skills, deficits and difficulties with a number of causes rather than a single condition.

Castles and Coltheart describe phonological and surface types of developmental dyslexia by analogy to classical subtypes of alexia (acquired dyslexia) which are classified according to the rate of errors in reading non-words. However, the distinction between surface and phonological dyslexia has not replaced the old empirical terminology of dysphonetic versus dyseidetic types of dyslexia. The surface/phonological distinction is only descriptive, and devoid of any aetiological assumption as to the underlying brain mechanisms (Galaburda and Cestnick 2003). Studies have, however, alluded to potential differential underlying brain mechanisms in these populations given performance differences (Cestnick et al.). The dysphonetic/dyseidetic distinction refers to two different mechanisms; one that relates to a speech discrimination deficit, and another that relates to a visual perception impairment.

www.numerons.in

Signs and symptoms

The symptoms of dyslexia vary according to the severity of the disorder as well as the age of the individual.

Preschool-aged children

It is difficult to obtain a certain diagnosis of dyslexia before a child begins school, but many dyslexic individuals have a history of difficulties that began well before kindergarten. Children who exhibit these symptoms early in life have a higher likelihood of being diagnosed as dyslexic than other children. These symptoms include:

www.numerons.in

- delays in speech
- slow learning of new words
- difficulty in rhyming words, as in nursery rhymes
- low letter knowledge
- letter reversal or mirror writing (for example, "Я" instead of "R")

Early primary school children

- Difficulty learning the alphabet or letters order
- Difficulty with associating sounds with the letters that represent them (sound-symbol correspondence)
- Difficulty identifying or generating rhyming words, or counting syllables in words (phonological awareness)
- Difficulty segmenting words into individual sounds, or blending sounds to make words (phonemic awareness)
- Difficulty with word retrieval or naming problems
- Difficulty learning to decode written words
- Difficulty distinguishing between similar sounds in words; mixing up sounds in polysyllabic words (auditory discrimination) (for example, "aminal" for animal, "bisghetti" for spaghetti)

www.numerons.in

Older primary school children

- Slow or inaccurate reading (although these individuals can read to an extent).
- Very poor spelling which has been called dysorthographia (orthographic coding)
- Difficulty reading out loud, reading words in the wrong order, skipping words and sometimes saying a word similar to another word (auditory processing disorder)
- Difficulty associating individual words with their correct meanings
- Difficulty with time keeping and concept of time when doing a certain task
- Difficulty with organization skills (working memory)
- Children with dyslexia may fail to see (and occasionally to hear) similarities and differences in letters and words, may not recognize the spacing that organizes letters into separate words, and may be unable to sound out the pronunciation of an unfamiliar word (auditory processing disorder).
- Tendencies to omit or add letters or words when writing and reading.

www.numerons.in

Secondary school children and adults

Some people with dyslexia are able to disguise their weaknesses (even from themselves) and often do acceptably well — or better — at GCSE level (U.K. - at 16 years old). Many students reach higher education before they encounter the threshold at which they are no longer able to compensate for their learning weaknesses.

One common misconception about dyslexia is that dyslexic readers write words backwards or move letters around when reading. In fact, this only occurs in a very small population of dyslexic readers. Dyslexic people are better identified by writing that does not seem to match their level of intelligence from prior observations. Additionally, dyslexic people often substitute similar-looking, but unrelated, words in place of the ones intended (what/want, say/saw, help/held, run/fun, fell/fall, to/too, who/how etc.).

www.numerons.in

Comorbidities

Several learning disabilities often occur with dyslexia, but it is unclear whether these learning disabilities share underlying neurological causes with dyslexia. These disabilities include, but are not limited to:

- Dysgraphia— a disorder which expresses itself primarily through writing or typing, although in some cases it may also affect eye–hand coordination direction or sequence oriented processes such as tying knots or carrying out a repetitive task. In dyslexia, dysgraphia is often multifactorial, due to impaired letter writing automaticity, finger motor sequencing challenges, organizational and elaborative difficulties, and impaired visual word form which makes it more difficult to retrieve the visual picture of words required for spelling. Dysgraphia is distinct from dyspraxia in that dyspraxia is simply related motor sequence impairment.
- Dyscalculia— a neurological condition characterized by a problem with basic sense of number and quantity and difficult retrieving rote math facts. Often people with this condition can understand very complex mathematical concepts and principles but have difficulty retrieving basic math facts involving addition and subtraction.

www.numerons.in

- Attention Deficit Disorder — a high degree of co-morbidity has been reported between ADD / ADHD and dyslexia, although the contributions of dyslexia-related challenges such as auditory verbal working memory to attention issues has not been well established
- Cluttering— a speech fluency disorder involving both the rate and rhythm of speech, resulting in impaired speech intelligibility. Speech is erratic and nonrhythmic, consisting of rapid and jerky spurts that usually involve faulty phrasing. The personality of people with cluttering bears striking resemblance to the personalities of those with learning disabilities.

www.numerons.in

Cause

The following theories should not be viewed as competing, but viewed as theories trying to explain the underlying causes of a similar set of symptoms from a variety of research perspectives and background.

Cerebellar theory

The Cerebellar Theory asserts that a mildly dysfunctional cerebellum can cause dyslexia. The cerebellum contributes to motor control during the articulation of speech, and the Cerebellar Theory proposes that articulation problems can contribute to the phonological processing deficits that can cause dyslexia. The Cerebellum also contributes to the automatisation of learnt behaviors, which includes learning the grapheme–phoneme relationships when reading text.

www.numerons.in

Evolutionary hypothesis

This theory considers that reading is an unnatural act carried out by humans for an exceedingly brief period in our evolutionary history. It has been less than a hundred years that western societies promoted reading to the mass population and therefore the forces that shape our reading behavior have been weak. Many areas of the world still do not even have access to reading for the majority of the population.

Magnocellular theory

The Magnocellular theory attempts to unify the Cerebellar Theory, the Phonological Theory, the Rapid Auditory Processing Theory, and the Visual Theory. The Magnocellular theory proposes that the magnocellular dysfunction is not only restricted to the visual pathways but also includes auditory and tactile modalities.

Naming speed deficit and double deficit theories

www.numerons.in

The speed with which an individual can engage in the rapid automatized naming of familiar objects or letters is a strong predictor of dyslexia. Slow naming speed can be identified as early as kindergarten and persists in adults with dyslexia.

A deficit in naming speed is hypothesized to represent a deficit that is separate from phonological processing deficit. Wolf identified four types of readers: readers with no deficits, readers with phonological processing deficit, readers with naming speed deficit, and readers with double deficit (that is, problems both with phonological processing and naming speed). Students with double deficits are most likely to have some sort of severe reading impairment.

Distinguishing among these deficits has important implications for instructional intervention. If students with double deficits receive instruction only in phonological processing, they are only receiving part of what they need.

www.numerons.in

Perceptual visual-noise exclusion hypothesis

The concept of a perceptual noise exclusion deficit (impaired filtering of behaviorally irrelevant visual information in dyslexia or visual-noise) is an emerging hypothesis, supported by research showing that subjects with dyslexia experience difficulty in performing visual tasks (such as motion detection in the presence of perceptual distractions) but do not show the same impairment when the distracting factors are removed in an experimental setting. The researchers have analogized their findings concerning visual discrimination tasks to findings in other research related to auditory discrimination tasks. They assert that dyslexic symptoms arise because of an impaired ability to filter out both visual and auditory distractions, and to categorize information so as to distinguish the important sensory data from the irrelevant.

www.numerons.in

Phonological deficit theory

The phonological deficit theory proposes that people with dyslexia have a specific sound manipulation impairment, which affects their auditory memory, word recall, and sound association skills when processing speech. The phonological theory explains a reading impairment when using an alphabetic writing system which requires learning the grapheme/phoneme correspondence, the relationship between the graphic letter symbols and speech sounds which they represent.

Rapid auditory processing theory

The rapid auditory processing theory is an alternative to the phonological deficit theory, which specifies that the primary deficit lies in the perception of short or rapidly varying sounds. Support for this theory arises from evidence that people with dyslexia show poor performance on a number of auditory tasks, including frequency discrimination and temporal order judgment.

www.numerons.in

Visual theory

The visual theory represents a traditional perspective of dyslexia, as being the result of a visual impairment creating problems when processing information from letters and words from a written text. This includes visual processing problems such as binocular, poor

vergence, and visual crowding. The Visual Theory does not deny the possibility of alternative causes of dyslexia.

Effect of language orthography

The complexity of a language's orthography or spelling system – formally, its orthographic depth – has a direct impact on how difficult it is to learn to read that language. English has a comparatively deep orthography within the Latin alphabet writing system, with a complex orthographic structure that employs spelling patterns at several levels: principally, letter-sound correspondences, syllables, and morphemes. Other languages, such as Spanish, have alphabetic orthographies that employ only letter-sound correspondences, so-called shallow orthographies. It is relatively easy to learn to read languages like Spanish; it is much more difficult to learn to read languages with more complex orthographies, such as English. Logographic writing systems, notably Japanese and Chinese characters, have graphemes that aren't linked directly to their pronunciation, which pose a different type of dyslexic difficulty.

www.numerons.in

From a neurological perspective, different types of writing system, for example alphabetic as compared to logographic writing systems, require different neurological pathways in order to read, write and spell. Because different writing systems require different parts of the brain to process the visual notation of speech, children with reading problems in one language might not have a reading problem in a language with a different orthography. The neurological skills required to perform the tasks of reading, writing, and spelling can vary between different writing systems and as a result different neurological deficits can cause dyslexic problems in relation to different orthographies.

www.numerons.in

Exacerbating conditions

Dyslexia is attributed to neurological factors that influence the individual's ability to read, write, and spell written language.

The following conditions may be contributory or overlapping factors, as they can lead to difficulty in reading:

- Aphasia - neurologically based speech disorders, which can cause alexia (acquired dyslexia).
- Attention deficit hyperactivity disorder - A disorder that occurs in between 12% and 24% of those with dyslexia.
- Auditory processing disorder - A condition that affects the ability to process auditory information. Auditory processing disorder is a listening disability. It can lead to problems with auditory memory and auditory sequencing. Many people with dyslexia have auditory processing problems including history of auditory reversals, and may develop their own logographic cues to compensate for this type of deficit. Auditory processing disorder is recognized as one of the major causes of dyslexia. Some children can acquire auditory processing disorder as a result of experiencing

www.numerons.in

otitis media with effusion (glue ear, sticky ear, grommets) and other severe ear conditions.

- Developmental dyspraxia - A neurological condition characterized by a marked difficulty in carrying out routine tasks involving balance, fine-motor control, kinesthetic coordination, difficulty in the use of speech sounds, problems with short term memory and organization are typical of dyspraxics.
- Scotopic sensitivity syndrome, also known as Irlen Syndrome - A term used to describe sensitivity to certain wavelengths of light which interfere with visual processing.
- Specific language impairment (SLI) - A developmental language disorder that can affect both expressive and receptive language. SLI is defined as a "pure" language impairment, meaning that is not related to or caused by other developmental disorders, hearing loss or acquired brain injury. A study by the Universities of Maastricht and Utrecht examined speech perception and speech production in 3-year-old Dutch children at familial risk of developing dyslexia. Their performance in speech sound categorization and their production of words was compared to that of age-matched children with SLI and typically developing controls. The results of the at-risk and SLI-group were highly similar. Analysis of the individual data revealed that both groups contained subgroups with good and poorly performing children. Their impaired expressive phonology seemed to be related to a deficit in speech perception. The findings indicate that both dyslexia and SLI can be explained by a multi-risk model which includes cognitive processes as well as genetic factors.

www.numerons.in

Experience of speech acquisition delays and speech and language problems can be due to problems processing and decoding auditory input prior to reproducing their own version of speech, and may be observed as stuttering, cluttering or hesitant speech.

www.numerons.in

Management

There is no cure for dyslexia, but dyslexic individuals can learn to read and write with appropriate educational support. Early intervention is very helpful.

Especially for undergraduates, some consideration of what 'reading' is and what it is for can be useful. There are techniques (reading the first sentence [and/or last] of each paragraph in a chapter, for example) which can give an overview of content. This can be sufficient for some purposes. Since stress and anxiety are contributors to a dyslexic's weaknesses in absorbing information, removing these can assist in improving understanding. When a dyslexic knows that not every reading experience must be onerous, it greatly helps their mental approach to the task.

www.numerons.in

The best approaches acknowledge that the objective in helping to improve a dyslexic's 'reading' is not to 'read-like-a-non-dyslexic-does', but to find a way of extracting information from text that works efficiently for someone who processes such information differently from the majority.

For dyslexia intervention with alphabet writing systems the fundamental aim is to increase a child's awareness of correspondences between graphemes and phonemes, and to relate these to reading and spelling. It has been found that training focused towards visual language and orthographic issues yields longer-lasting gains than mere oral phonological training.

The best form of approach is determined by the underlying neurological cause(s) of the dyslexic symptoms.

www.numerons.in

Context sensitive spell checkers combined with text-to-speech systems offer forms of assistive technology to dyslexia users, supporting reading and writing.

Recent research suggests that adaptive working memory training using a program called Jungle Memory was effective in boosting IQ, working memory, and literacy scores in students with dyslexia.

Fast ForWord software, which works on auditory processing, working memory and other aspects of dyslexia has also been successful in helping dyslexia.

History

- Identified by Oswald Berkhan in 1881, the term 'dyslexia' was later coined in 1887 by Rudolf Berlin, an ophthalmologist practising in Stuttgart, Germany, from the Greek prefix δυσ- (dus-), "hard, bad, difficult" + λέξις (lexis), "speech, word".
- In 1896, W. Pringle Morgan published a description of a reading-specific learning disorder in the British Medical Journal titled "Congenital Word Blindness".
- During the 1890s and early 1900s, James Hinshelwood published a series of articles in medical journals describing similar cases of congenital word blindness. In his 1917 book Congenital Word Blindness, Hinshelwood asserted that the primary disability was in visual memory for words and letters, and described symptoms including letter reversals, and difficulties with spelling and reading comprehension.
- 1925 Samuel T. Orton determined that there was a syndrome unrelated to brain damage that made learning to read difficult. Orton's theory strephosymbolia described individuals with dyslexia having difficulty associating the visual forms of words with their spoken forms. Orton observed that reading deficits in dyslexia did not seem to stem from strictly visual deficits. He believed the condition was caused by the failure to establish hemispheric dominance in the brain. Orton later worked with the psychologist and educator Anna Gillingham to develop an educational intervention that pioneered the use of simultaneous multisensory instruction.
- In contrast, Dearborn, Gates, Bennet and Blau considered a faulty guidance of the seeing mechanism to be the cause. They sought to discover if a conflict between spontaneous orientation of the scanning action of the eyes from right to left and training aimed at the acquisition of an opposite direction would allow an interpretation of the facts observed in the dyslexic disorder and especially of the ability to mirror-read.

www.numerons.in

- 1949 Research conducted under G. Mahec show that the phenomenon is clearly linked to the dynamics of sight as it disappears when the space between letters is increased, transforming the reading into spelling. This experience also explains the ability to mirror-read.
- 1968 Makita suggested that dyslexia was mostly absent among Japanese children. A 2005 study shows that Makita's claim of rarity of incidence of reading disabilities in Japan to be incorrect.
- In the 1970s a new hypothesis emerged: that dyslexia stems from a deficit in phonological processing or difficulty in recognizing that spoken words are formed by discrete phonemes. Affected individuals have difficulty associating these sounds with the visual letters that make up written words. Key studies suggested the importance of phonological awareness,
- 1979 Galaburda and Kemper, and Galaburda et al. 1985, reported observations from the examination of post autopsy brains of people with dyslexia. Their studies reporting observed anatomical differences in the language center in a dyslexic brain, taken with the similar work of Cohen et al. 1989, suggested abnormal cortical development, which was presumed to occur before or during the sixth month of foetal brain development.
- 1993 Castles and Coltheart describe developmental dyslexia as two prevalent and distinct varieties using the subtypes of Alexia, Surface and Phonological Dyslexia. Manis et al. 1996, concluded that there were probably more than two subtypes of dyslexia, which would be related to multiple underlying deficits. Cestnick and Coltheart (1999) demonstrated what these underlying deficits are in part, through unveiling different profiles of phonological versus surface dyslexics. Cestnick and Jerger (2000) and Cestnick (2001) further demonstrated distinct processing differences between phonological and surface dyslexics.
- 1994 From post autopsy specimens Galaburda et al., reported : Abnormal auditory processing in people with dyslexia suggests that accompanying anatomical abnormalities might be present in the auditory system. Supported the reported behavioral findings of a left hemisphere-based phonological defect in dyslexic individuals.
- The development of neuroimaging technologies during the 1980s and 1990s enabled dyslexia research to make significant advances. Positron emission tomography (PET) and functional magnetic resonance imaging (fMRI) studies have revealed the neural signature of adult normal reading (e.g. Fiez and Petersen, 1998; Turkeltaub et al., 2002 and phonological processing (e.g., Gelfand and Bookheimer, 2003; Poldrack et al., 1999). Employing various experimental approaches and paradigms (e.g., the detection or judgment of rhymes, nonword reading, and implicit reading), these studies have localized dysfunctional phonological processing in dyslexia to left-hemisphere perisylvian regions, especially for the alphabetic writing system (Paulesu et al., 2001; for review, see Eden and Zeffiro, 1998,). However, it has been demonstrated that in nonalphabetic scripts, where reading places less demands on phonemic processing and the integration of visual-orthographic information is crucial, dyslexia is associated with under activity of the left middle frontal gyrus (Siok et al., 2004).

www.numerons.in

- 1999 Wydell and Butterworth reported the case study of an English-Japanese bilingual with monolingual dyslexia. Suggesting that any language where orthography-to-phonology mapping is transparent, or even opaque, or any language whose orthographic unit representing sound is coarse (i.e. at a whole character or word level) should not produce a high incidence of developmental phonological dyslexia, and that orthography can influence dyslexic symptoms.
- 2003 Ziegler and colleagues claimed that the dyslexia suffered by German or Italian dyslexics is very similar to the one suffered by English dyslexics (readers of different—shallow versus deep orthographic systems), supporting the idea that the origin of dyslexia is mostly biological.
- 2007 Lyytinen et al. Researchers are seeking a link between the neurological and genetic findings, and the reading disorder.
- 2008 S Heim et al. in a paper titled "Cognitive subtypes of dyslexia" describe how they compared different sub-groups of dyslexics in comparison with a control group. This is one of the first studies not to just compare dyslexics with a non dyslexic control, but to go further and compared the different cognitive sub groups with a non dyslexic control group.
- 2008 Wai Ting Siok et al. in a paper titled "A structural–functional basis for dyslexia in the cortex of Chinese readers" describe how dyslexia is language dependent, and especially between alphabetic and non-alphabetic writing systems.
- 2010 KK Chung et al. investigated the "Cognitive profiles of Hong Kong Chinese adolescents with dyslexia".

www.numerons.in

Society and culture

Education law

There are many different national legal statutes and different national special education support structures with regard to special education provision which relate to the management of dyslexia.

Film, television, and literature

There have been a number of films, television programs, and works of fiction which focus on the topic of dyslexia.

Research

The majority of currently available dyslexia research relates to the alphabetic writing system, and especially to languages of European origin. However, substantial research is also available regarding dyslexia for speakers of Arabic, Chinese, and Hebrew.

www.numerons.in

Neuroimaging

Modern neuroimaging techniques such as functional magnetic resonance imaging (fMRI) and positron emission tomography (PET) have produced clear evidence of structural

differences in the brains of children with reading difficulties. It has been found that people with dyslexia have a deficit in parts of the left hemisphere of the brain involved in reading, which includes the inferior frontal gyrus, inferior parietal lobule, and middle and ventral temporal cortex.

That dyslexia is neurobiological in origin is supported by what Lyon et al. proclaimed as "overwhelming and converging data from functional brain imaging investigations" (2003, p. 3). The results of these studies suggest that there are observable differences in how the dyslexic brain functions when compared to the brain of a typical reader. Using fMRI, Shaywitz found that good readers show a consistent pattern of strong activation in the back of the brain with weaker activation in the front of the brain during reading tasks. In contrast, the brain activation pattern in dyslexics is the opposite during reading tasks—the frontal part of the brain becomes overactive with weaker activation in the back. Shaywitz points out "It is as if these struggling readers are using the systems in the front of the brain to try to compensate for the disruption in the back of the brain."

Brain activation studies using PET to study language have produced a breakthrough in understanding of the neural basis of language over the past decade. A neural basis for the visual lexicon and for auditory verbal short term memory components have been proposed, with some implication that the observed neural manifestation of developmental dyslexia is task-specific (i.e., functional rather than structural).

A University of Hong Kong study argues that dyslexia affects different structural parts of children's brains depending on the language which the children read. The study focused on comparing children that were raised reading English and children raised reading Chinese. This is supported in a review by T. Hadzibeganovic et al. (2010).

A University of Maastricht (Netherlands) study revealed that adult dyslexic readers underactivate superior temporal cortex for the integration of letters and speech sounds.

Genetic

Molecular studies have linked several forms of dyslexia to genetic markers for dyslexia. Several candidate genes have been identified, including at the two regions first related to dyslexia: DCDC2 and KIAA0319 on chromosome 6, and DYX1C1 on chromosome 15.

A 2007 review reported that no specific cognitive processes are known to be influenced by the proposed susceptibility genes.

A unifying theoretical framework of three working memory components provides a systems perspective for discussing past and new findings in a 12-year research program that point to heterogeneity in the genetic and brain basis and behavioral expression of dyslexia.

Controversy

In recent years there has been significant debate on the categorization of dyslexia. In particular, Elliot and Gibbs argue that "attempts to distinguish between categories of 'dyslexia' and 'poor reader' or 'reading disabled' are scientifically unsupportable, arbitrary and thus potentially discriminatory".

While acknowledging that reading disability is a valid scientific curiosity, and that "seeking greater understanding of the relationship between visual symbols and spoken language is crucial" and that while there was "potential of genetics and neuroscience for guiding assessment and educational practice at some stage in the future", they conclude that "there is a mistaken belief that current knowledge in these fields is sufficient to justify a category of dyslexia as a subset of those who encounter reading difficulties".

www.numerons.in

Speech disorder

Speech disorders or speech impediments are a type of communication disorders where 'normal' speech is disrupted. This can mean stuttering, lisps, etc. Someone who is unable to speak due to a speech disorder is considered mute.

Classification

Classifying speech into normal and disordered is more problematic than it first seems. By a strict classification, only 5% to 10% of the population has a completely normal manner of speaking (with respect to all parameters) and healthy voice; all others suffer from one disorder or another.

www.numerons.in

Stuttering affects approximately 1% of the adult population.

Cluttering, a speech disorder that has similarities to stuttering.

Dysprosody is the rarest neurological speech disorder. It is characterized by alterations in intensity, in the timing of utterance segments, and in rhythm, cadence, and intonation of words. The changes to the duration, the fundamental frequency, and the intensity of tonic and atonic syllables of the sentences spoken, deprive an individual's particular speech of its characteristics. The cause of dysprosody is usually associated with neurological pathologies such as brain vascular accidents, cranioencephalic traumatisms, and brain tumors.

Muteness is complete inability to speak

Speech sound disorders involve difficulty in producing specific speech sounds (most often certain consonants, such as /s/ or /r/), and are subdivided into articulation disorders (also called phonetic disorders) and phonemic disorders. Articulation disorders are characterized by difficulty learning to physically produce sounds. Phonemic disorders are characterized by difficulty in learning the sound distinctions of a language, so that one sound may be used in place of many. However, it is not uncommon for a single person to have a mixed speech sound disorder with both phonemic and phonetic components.

www.numerons.in

Voice disorders are impairments, often physical, that involve the function of the larynx or vocal resonance.

Dysarthria is a weakness or paralysis of speech muscles caused by damage to the nerves and/or brain. Dysarthria is often caused by strokes, parkinsons disease, ALS, head or neck injuries, surgical accident, or cerebral palsy.

www.numerons.in

Apraxia of speech may result from stroke or be developmental, and involves inconsistent production of speech sounds and rearranging of sounds in a word ("potato" may become "topato" and next "totapo"). Production of words becomes more difficult with effort, but common phrases may sometimes be spoken spontaneously without effort. It is now considered unlikely that childhood apraxia of speech and acquired apraxia of speech are the same thing, though they share many characteristics.

There are three different levels of classification when determining the magnitude and type of a speech disorder and the proper treatment or therapy:

Sounds the patient can produce
- Phonemic- can be produced easily; used meaningfully and contrastively
- Phonetic- produced only upon request; not used consistently, meaningfully, or contrastively; not used in connected speech

Stimulable sounds
- Easily stimulable
- Stimulable after demonstration and probing (i.e. with a tongue depressor)

www.numerons.in

Cannot produce the sound
- Cannot be produced voluntarily
- No production ever observed

Causes

In many cases the cause is unknown. However, there are various known causes of speech impediments, such as "hearing loss, neurological disorders, brain injury, mental retardation, drug abuse, physical impairments such as Cleft lip and palate, and vocal abuse or misuse." Child abuse may also be a cause in some cases.

Treatment

Many of these types of disorders can be treated by speech therapy, but others require medical attention by a doctor in phoniatrics. Other treatments include correction of organic conditions and psychotherapy.

www.numerons.in

In the United States, school-age children with a speech disorder are often placed in special education programs. More than 700,000 of the students served in the public schools' special education programs in the 2000-2001 school year were categorized as having a

speech or language impediment. This estimate does not include children who have speech/language problems secondary to other conditions such as deafness". Many school districts provide the students with speech therapy during school hours, although extended day and summer services may be appropriate under certain circumstances.

Patients will be treated in teams, depending on the type of disorder they have. A team can include; SLP's, specialists, family doctors, teachers,and parents/family members.

www.numerons.in

Social effects of speech disorders

Suffering from a speech disorder can have negative social effects, especially among young children. Those with a speech disorder can be targets of bullying because of their disorder. The bullying can result in decreased self-esteem. Later in life, bullying is experienced less by a general population, as people become more understanding as they age.

Language disorders

Language disorders are usually considered distinct from speech disorders, even though they are often used synonymously.

Speech disorders refer to problems in producing the sounds of speech or with the quality of voice, where language disorders are usually an impairment of either understanding words or being able to use words and does not have to do with speech production

www.numerons.in

Scotopic sensitivity syndrome

Scotopic sensitivity syndrome, also known as Irlen Syndrome and Visual Stress Syndrome, approximating in some ways to Meares Irlen syndrome, and 'Visual Stress', refers to visual perceptual disorder(s) affecting primarily reading and writing based activities. Its existence is not recognized as a homogenous condition by the American Academy of Pediatrics or the American Optometric Association, although its symptomatic occurrence is accepted by the latter and has never been contested by the former (see skepticism below). It is accepted as a homogenous condition however by a respected body of international expert medical opinion, and has been studied in the former Applied Psychology Unit, Cambridge University in the UK, and the Scottish Parliament has also funded a research and treatment centre at the Glasgow Caledonian University, for the associated condition of Meares/Irlen Syndrome.

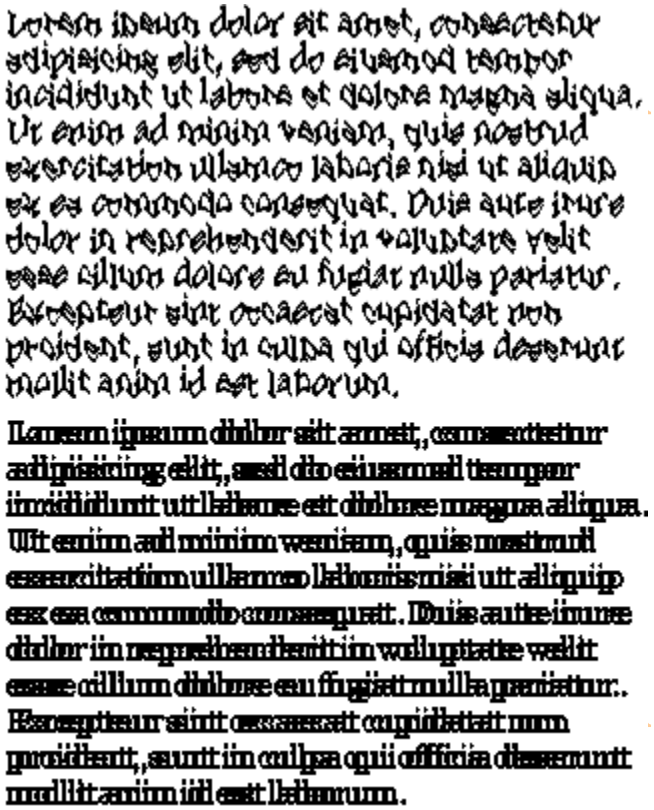
Irlen syndrome is sometimes categorised as a form of dyslexia. However, bestselling autistic author, Donna Williams, in her book Like Colour To The Blind wrote about her experience of tinted lenses (Irlen filters) after being diagnosed with scotopic sensitivity. In this book she described the lenses as enabling her to have cohesive, unfragmented vision, able to see faces, bodies and objects as a whole for the first time and reducing the extremity of experiences such as meaning-blindness, face blindness, inability to learn to read facial expression and body language and the social consequences of these impairments. This led

www.numerons.in

to a worldwide raised awareness of scotopic sensitivity as a sensory perceptual problem common in many (but not all) people with autism and expanded awareness of the potential effects of Scotopic Sensitivity far beyond that of reading disability, also leading to awareness of the effects of fluorescent lighting on those with this perceptual disorder.

The condition was separately described by two people working individually, each unaware of the other's work. In the early 1980s New Zealand teacher Olive Meares described the visual distortions some individuals reported when reading from white paper, while American therapist Helen Irlen wrote a paper about the use of coloured overlays aiding the reading abilities of some people. Irlen, who was the first to systematically define the condition, named her findings "scotopic sensitivity", though in the discussions and debates over the following years some often referred to it as Meares-Irlen syndrome. Testing for scotopic sensitivity were also taken up by optometrists, opticians, and orthoptists in UK hospitals, and by optometrists and opticians in private practice using a technique that used the Intuitive Colorimeter, developed under Medical Research Council license. A major leap forward has been realised by Orthoscopics in the UK, with extend color coverage and tints manufactured by Hoya to match. Other commercial organisations have produced sets of therapeutic tints, although most have not received scientific evaluation.
Two examples of how a sufferer may see text

Theory



Two examples of how a sufferer may see text

Scotopic sensitivity syndrome is based on the theory that some individuals have hypersensitive photoreceptors, visual pathways, and/or brain systems that react inappropriately to some wavelengths of light. Vision occurs when photons are detected by the retina, initiating a biochemical process affecting the visual pathways and deep structures of the brain. A growing number of researchers are taking an interest in the view that inappropriate biochemical processing has the potential to cause physiological and/or visual perceptual problems. Many of these problems are grouped together under the label "scotopic sensitivity syndrome".

www.numerons.in

In simple terms, the theory is that some signals from the eye are not getting to the brain intact and / or on time. Although the eye might be functioning correctly, the brain receives what is like a double exposed picture where the location of items is confused. The brain tries to filter out the bad information and so the conscious mind receives a reconstructed image. That image may be of the items moving (the brain constantly changing its best guess of what is there), blurred outcomes (inability to form a view of what is there), gaps in wrong spots, and a variety of other minor errors. There may also be exhaustion (from the mental effort to unscramble) and sore eyes (from the eyes constantly seeking extra data to aid the process) The problem is worst where different colours do not all give a similar outcome. In nature you get a lot of consistent data but on a man made item (e.g. paper) there might only be limited colour sets. i.e. The condition does not generate practical problems where there is lots of redundant data for the brain to use. The pragmatic response by Irlen was not to try to fix the problem but to avoid it. By filtering out the light most likely to generate problem signals to the brain, she was able to improve the likelihood that the brain will correctly distinguish between good and bad information. It also seems likely that in some individuals, over time the brain learns which colours are the problem items and improves its ability to reconstruct an accurate image.

www.numerons.in

Symptoms

One or more of these symptoms may be related to the condition:

- Eye-strain
- Fatigue
- Headaches (including migraine)
- Nausea, including visually related motion sickness
- Problems with depth perception (catching balls, judging distance, etc.)
- Restricted field of view and span of recognition
- Discomfort with busy patterns, particularly stripes ("visual stress" and "pattern glare")
- Discomfort with extreme conditions of bright/dark contrast (i.e. backlighting)
- Discomfort or difficulty reading (reading involves busy patterns, particularly stripes. People with strong symptoms of the syndrome find it very difficult to read black text on white paper, particularly when the paper is slightly shiny.)
- Text that appears to move (rise, fall, swirl, shake, etc.)
- Losing text content and only seeing rivers of white through the text
- Words moving together becoming one unrecognizable word

www.numerons.in

- Attention and concentration difficulties
- Seeing the part and losing the whole
- Epileptic seizure related to strobing or pattern glare

Treatment

The use of tinted lenses in glasses and coloured overlay sheets has been prescribed by many doctors; however, the efficacy of such treatment is questionable. It has been felt to be efficient treatment by some, and inappropriate by others, because more conventional treatments are sometimes more appropriate.

www.numerons.in

The College of Optometry (UK) has specified guidelines for optometrists who use the colorimeter system. A society for colored lens prescribers has been established to provide a list of eye-care practitioners with expertise in the provision of colored lenses for the treatment of visual stress.

The Promethean Trust, a Norwich-based charity for dyslexic children, has found that the use of a cursor has eliminated the need for colored overlays or lenses. The cursor is simply a piece of card or plastic, approximately the size of a business card, with a notch cut out of one corner. The reader (or the remedial teacher) uses this to track print from left to right, and at the same time the card prevents the eyes from wandering ahead. Although no formal research has been conducted, it is likely that most cases of visual confusion result from the eyes moving in mini-saccades when the reader encounters an unfamiliar word. This occurs as the reader subconsciously tries to scramble letters to achieve a 'fit' with a familiar word. This creates the subjective impression that the letters 'won't stay still'.

www.numerons.in

Self help for SSS

The following has been helpful to students who suffer from this visual difficulty and cannot afford glasses or overlays. Teachers have found that it is easier to provide colored paper to students who struggle with reading. All tests, worksheets, and activities are on colored paper. Try changing a computer's backdrop from a grey to a blue/grey color for print to be on. Since it does not bother other students without SSS, it is easier just to keep the backdrop colored for all students. Teachers have also found that during state mandated testing time, students with SSS are allowed to wear hats with bills, have cardboard shadow boxes over their desks, and/or sit by windows. This allows students to feel comfortable reading on white paper. Teachers also suggest to parents to provide their child with colored writing paper to help them in their assignments. Teachers have also found out that if a child learns to write in cursive, that child performs better in their ability to write and read their own notes. Some teachers think that cursive writing is not as boxed as print. Some students report that their reading is better when the letters are slanted, so script writing is becoming preferable in teaching students to write.

www.numerons.in

Irlen Method

The Irlen Method is a controversial system that is intended to improve reading difficulties associated with scotopic sensitivity syndrome using tinted lenses and overlays.

Irlen Screener

"Irlen Screeners are certified to administer the first testing session and determine whether an individual will benefit from further evaluation for Irlen Spectral Filters."

www.numerons.in

Irlen Diagnosticians

"Irlen Diagnosticians are certified to administer both testing sessions. During the initial testing session, an individual is screened to determine whether wearing Irlen Spectral Filters will make a difference and the amount of improvement for reading and other academic activities. In addition, during this session 12 other areas will be evaluated and recommendations made. Only Irlen Diagnosticians are certified to test and determine your customized spectral filter worn as Irlen glasses or contact lenses and conduct yearly rechecks."

Intuitive Colorimeter

Developed by Arnold Wilkins, Ph.D., University of Essex, England, an alternative system for the identification of tint to reduce symptoms.

Skepticism

www.numerons.in

Skepticism surrounding scotopic sensitivity syndrome has evolved on several fronts:

- Whether SSS exists as a distinct, predictably identifiable disease with a reasonable pathophysiological mechanism;
- Whether SSS is causally or incidentally related to dyslexia, autism, or other conditions; and
- Whether existing methods of SSS treatment are appropriate and effective.

The American Academy of Pediatrics (AAP) does not believe that there is any scientific evidence or basis for the use of colored lenses (the treatment used for SSS) . When discussing its scientific basis, the AAP mentions that "[t]he method used to select the lens or filter color has been highly variable,the color selection has also shown considerable variability,and the test-retest consistency has been poor" (p. 843)

The association of scotopic sensitivity syndrome and dyslexia has been challenged by many authors in both the optometric and ophthalmologic communities. but recent scientific evidence suggests a weak association.

www.numerons.in

We have carried out a randomised prospective controlled trial of the effect of tinted lenses on the reading ability of 24 non-asthmatic dyslexic children aged between nine and twelve years. Reading ability was assessed using the Neale Analysis of Reading. After one school

term, there was no significant difference in the change in reading age between treatment and control groups. After two school terms (approximately six months), only 11 children (44%) were still wearing the glasses. Of 381 suitable subjects for entry into the study, 208 were excluded because of a diagnosis of asthma (to avoid effects of medication on cerebral function). As a result, we may have excluded subjects who would have responded favorably to tinted lenses.

Critics claim that the symptoms of those with Scotopic Sensitivity Syndrome are related to already known visual disorders. According to a statement released by the American Optometric Association in 2004:

www.numerons.in

There is evidence that the underlying symptoms associated with the Irlen Syndrome are related to identifiable vision anomalies, e.g., accommodative, binocular, and ocular motor dysfunctions, in many patients seeking help from colored lenses. Furthermore, such conditions return to normal function when appropriately treated with lenses, prisms, or vision therapy. When patients exhibiting the Irlen Syndrome were treated with vision therapy, their symptoms were relieved. These patients were no longer classified as exhibiting this syndrome, and therefore did not demonstrate a need for the colored overlays or tinted lenses.

This assessment has been criticised however for applying a self defining criteria to the tests which reached this conclusion.

A previous controlled study found the lenses not to significantly improve reading but several of its peer reviewed studies did find distinct neurological patterns in those displaying strong symptoms consistent with the syndrome.

www.numerons.in

Although experts are divided over the pathology of Irlen Syndrome, and whether it is a homogenous condition, or if instead several distinct syndromes are not being mistakenly placed under this loosely defined one, what is agreed is that for sufferers, the symptoms are very real. In a small minority of extreme cases they do appear quite pronounced, even acute. In other words, the symptoms on sufferers is not disputed by any recognised body of medical opinion, but there is a lively debate over exactly what is the cause and how to classify it. This is important to stress, because the impression may have been gathered from the discussion on this subject, that those displaying symptoms are in some sense 'faking it'. In truth very few researchers, and none of the most widely respected ones, believe this to be the case, nor have they ever suggested this."

Terminology

www.numerons.in

Critics assert that the term "scotopic sensitivity" is a misnomer given that the symptoms of "Scotopic Sensitivity Syndrome" reportedly occur during photopic conditions.

Mental retardation

Mental retardation (MR) is a generalized disorder appearing before adulthood, characterized by significantly impaired cognitive functioning and deficits in two or more adaptive behaviors. It has historically been defined as an Intelligence Quotient score under 70. Once focused almost entirely on cognition, the definition now includes both a component relating to mental functioning and one relating to individuals' functional skills in their environment. As a result, a person with a below-average intelligence quotient (BAIQ) may not be considered mentally retarded. Syndromic mental retardation is intellectual deficits associated with other medical and behavioral signs and symptoms. Non-syndromic mental retardation refers to intellectual deficits that appear without other abnormalities.

www.numerons.in

Mental retardation is a subtype of intellectual disability, although that term is now preferred by most advocates in most English-speaking countries as a euphemism for MR. However, intellectual disability is a broader concept and includes intellectual deficits that are too mild to properly qualify as mental retardation, too specific (as in specific learning disability), or acquired later in life, through acquired brain injuries or neurodegenerative diseases like dementia. Intellectual disabilities may appear at any age. Developmental disability is any disability that is due to problems with growth and development. This term encompasses many congenital medical conditions that have no mental or intellectual components, although it, too, is sometimes used as a euphemism for MR.

www.numerons.in

Signs and symptoms

The signs and symptoms of mental retardation are all behavioral. Most people with mental retardation do not look like they have any type of intellectual disability, especially if the disability is caused by environmental factors such as malnutrition or lead poisoning. The so-called "typical appearance" ascribed to people with mental retardation is only present in a minority of cases, all of which involve syndromic mental retardation.

Children with mental retardation may learn to sit up, to crawl, or to walk later than other children, or they may learn to talk later. Both adults and children with mental retardation may also exhibit some or all of the following characteristics:

- Delays in oral language development
- Deficits in memory skills
- Difficulty learning social rules
- Difficulty with problem solving skills
- Delays in the development of adaptive behaviors such as self-help or self-care skills
- Lack of social inhibitors

www.numerons.in

Children with mental retardation learn more slowly than a typical child. Children may take longer to learn language, develop social skills, and take care of their personal needs, such as dressing or eating. Learning will take them longer, require more repetition, and skills may need to be adapted to their learning level. Nevertheless, virtually every child is able to learn, develop and become a participating member of the community.

In early childhood, mild mental retardation (IQ 50–69, a cognitive ability about half to two-thirds of standard) may not be obvious, and may not be identified until children begin school. Even when poor academic performance is recognized, it may take expert assessment to distinguish mild mental retardation from learning disability or emotional/behavioral disorders. People with mild MR are capable of learning reading and mathematics skills to approximately the level of a typical child aged 9 to 12. They can learn self-care and practical skills, such as cooking or using the local mass transit system. As individuals with mild mental retardation reach adulthood, many learn to live independently and maintain gainful employment.

Moderate mental retardation (IQ 35–49) is nearly always apparent within the first years of life. Speech delays are particularly common signs of moderate MR. People with moderate mental retardation need considerable supports in school, at home, and in the community in order to participate fully. While their academic potential is limited, they can learn simple health and safety skills and to participate in simple activities. As adults they may live with their parents, in a supportive group home, or even semi-independently with significant supportive services to help them, for example, manage their finances. As adults, they may work in a sheltered workshop.

www.numerons.in

A person with severe or profound mental retardation will need more intensive support and supervision his or her entire life. They may learn some activities of daily living. Some will require full-time care by an attendant.

Cause

Among children, the cause is unknown for one-third to one-half of cases. Down syndrome, velocariofacial syndrome, and fetal alcohol syndrome are the three most common inborn causes. However, doctors have found many other causes. The most common are:

- Genetic conditions. Sometimes disability is caused by abnormal genes inherited from parents, errors when genes combine, or other reasons. The most prevalent genetic conditions include Down syndrome, Klinefelter's syndrome, Fragile X syndrome, Neurofibromatosis, congenital hypothyroidism, Williams syndrome, Phenylketonuria (PKU), and Prader-Willi syndrome. Other genetic conditions include Phelan-McDermid syndrome (22q13del), Mowat-Wilson syndrome, genetic ciliopathy, and Siderius type X-linked mental retardation (OMIM 300263) as caused by mutations in the PHF8 gene (OMIM 300560). In the rarest of cases, abnormalities with the X or Y chromosome may also cause disability. 48, XXXX and 49, XXXXX syndrome affect a small number of girls worldwide, while boys may be affected by 47, XYY, 49, XXXXY, or 49, XYYYY.

- Problems during pregnancy. Mental disability can result when the fetus does not develop properly. For example, there may be a problem with the way the fetus' cells divide as it grows. A woman who drinks alcohol (see fetal alcohol syndrome) or gets an infection like rubella during pregnancy may also have a baby with mental disability.
- Problems at birth. If a baby has problems during labor and birth, such as not getting enough oxygen, he or she may have developmental disability due to brain damage.
- Exposure to certain types of disease or toxins. Diseases like whooping cough, measles, or meningitis can cause mental disability if medical care is delayed or inadequate. Exposure to poisons like lead or mercury may also affect mental ability.
- Iodine deficiency, affecting approximately 2 billion people worldwide, is the leading preventable cause of mental disability in areas of the developing world where iodine deficiency is endemic. Iodine deficiency also causes goiter, an enlargement of the thyroid gland. More common than full-fledged cretinism, as retardation caused by severe iodine deficiency is called, is mild impairment of intelligence. Certain areas of the world due to natural deficiency and governmental inaction are severely affected. India is the most outstanding, with 500 million suffering from deficiency, 54 million from goiter, and 2 million from cretinism. Among other nations affected by iodine deficiency, China and Kazakhstan have instituted widespread iodization programs, whereas, as of 2006, Russia had not.
- Malnutrition is a common cause of reduced intelligence in parts of the world affected by famine, such as Ethiopia.
- Absence of the arcuate fasciculus.

www.numerons.in

Diagnosis

According to the latest edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), three criteria must be met for a diagnosis of mental retardation: an IQ below 70, significant limitations in two or more areas of adaptive behavior (as measured by an adaptive behavior rating scale, i.e. communication, self-help skills, interpersonal skills, and more), and evidence that the limitations became apparent before the age of 18.

It is formally diagnosed by professional assessment of intelligence and adaptive behavior.
IQ below 70

The first English-language IQ test, the Terman-Binet, was adapted from an instrument used to measure potential to achieve developed by Binet in France. Terman translated the test and employed it as a means to measure intellectual capacity based on oral language, vocabulary, numerical reasoning, memory, motor speed and analysis skills. The mean score on the currently available IQ tests is 100, with a standard deviation of 15 (WAIS/WISC-IV) or 16 (Stanford-Binet). Sub-average intelligence is generally considered to be present when an individual scores two standard deviations below the test mean. Factors other than cognitive ability (depression, anxiety, etc.) can contribute to low IQ scores; it is important for the evaluator to rule them out prior to concluding that measured IQ is "significantly below average".

The following ranges, based on Standard Scores of intelligence tests, reflect the categories of the American Association of Mental Retardation, the Diagnostic and Statistical Manual of Mental Disorders-IV-TR, and the International Classification of Diseases-10:

Class	IQ
Profound mental retardation	Below 20
Severe mental retardation	20–34
Moderate mental retardation	35–49
Mild mental retardation	50–69
Borderline intellectual functioning	70–84

www.numerons.in

Since the diagnosis is not based only on IQ scores, but must also take into consideration a person's adaptive functioning, the diagnosis is not made rigidly. It encompasses intellectual scores, adaptive functioning scores from an adaptive behavior rating scale based on descriptions of known abilities provided by someone familiar with the person, and also the observations of the assessment examiner who is able to find out directly from the person what he or she can understand, communicate, and the like.
Significant limitations in two or more areas of adaptive behavior

Adaptive behavior, or adaptive functioning, refers to the skills needed to live independently (or at the minimally acceptable level for age). To assess adaptive behavior, professionals compare the functional abilities of a child to those of other children of similar age. To measure adaptive behavior, professionals use structured interviews, with which they systematically elicit information about persons' functioning in the community from people who know them well. There are many adaptive behavior scales, and accurate assessment of the quality of someone's adaptive behavior requires clinical judgment as well. Certain skills are important to adaptive behavior, such as:

www.numerons.in

- Daily living skills, such as getting dressed, using the bathroom, and feeding oneself
- Communication skills, such as understanding what is said and being able to answer
- Social skills with peers, family members, spouses, adults, and others

Evidence that the limitations became apparent in childhood

This third condition is used to distinguish mental retardation from dementing conditions such as Alzheimer's disease or due to traumatic injuries with attendant brain damage.

Management

www.numerons.in

By most definitions mental retardation is more accurately considered a disability rather than a disease. MR can be distinguished in many ways from mental illness, such as schizophrenia or depression. Currently, there is no "cure" for an established disability, though with appropriate support and teaching, most individuals can learn to do many things.

There are thousands of agencies around the world that provide assistance for people with developmental disabilities. They include state-run, for-profit, and non-profit, privately run agencies. Within one agency there could be departments that include fully staffed residential homes, day rehabilitation programs that approximate schools, workshops wherein people with disabilities can obtain jobs, programs that assist people with developmental disabilities in obtaining jobs in the community, programs that provide support for people with developmental disabilities who have their own apartments, programs that assist them with raising their children, and many more. There are also many agencies and programs for parents of children with developmental disabilities.

www.numerons.in

Beyond that there are specific programs that people with developmental disabilities can take part in wherein they learn basic life skills. These "goals" may take a much longer amount of time for them to accomplish, but the ultimate goal is independence. This may be anything from independence in tooth brushing to an independent residence. People with developmental disabilities learn throughout their lives and can obtain many new skills even late in life with the help of their families, caregivers, clinicians and the people who coordinate the efforts of all of these people.

Although there is no specific medication for mental retardation, many people with developmental disabilities have further medical complications and may take several medications. For example autisic children with developmental delay may utilize anti-psychotics or mood stabilizers to help with behavior. Use of psychotropic medications such as benzodiazepines in people with mental retardation requires monitoring and vigilance as side effects occur commonly and are often misdiagnosed as behavioural and psychiatric problems.

www.numerons.in

Epidemiology

Mental retardation affects about 2–3% of people. 75–90% of the affected people have mild retardation.

Non-syndromic or idiopathic MR accounts for 30–50% of cases. About a quarter of cases are caused by a genetic disorder.

History of the condition

Intellectual disabilities of all kinds have been documented under a variety of names throughout history. Throughout much of human history, society was unkind to those with any type of disability, and people with intellectual disabilities were commonly viewed as burdens on their families.

www.numerons.in

Greek and Roman philosophers, who valued reasoning abilities, disparaged people with intellectual disabilities as barely human. The oldest physiological view of mental retardation is in the writings of Hippocrates in the late fifth century BCE, who believed that it was caused by an imbalance in the four humors in the brain.

Until the Enlightenment in Europe, care and asylum was provided by families and the church (in monasteries and other religious communities), focusing on the provision of basic physical needs such as food, shelter and clothing. Negative stereotypes were prominent in social attitudes of the time.

In the 13th century, England declared people with intellectual disabilities to be incapable of making decisions or managing their affairs. Guardianships were created to take over their financial affairs.

www.numerons.in

In the 17th century, Thomas Willis provided the first description of intellectual disabilities as a disease. He believed that it was caused by structural problems in the brain. According to Willis, the anatomical problems could be either an inborn condition or acquired later in life.

In the 18th and 19th centuries, housing and care moved away from families and towards an asylum model. People were placed by, or removed from, their families (usually in infancy) and housed in large professional institutions, many of which were self-sufficient through the labor of the residents. Some of these institutions provided a very basic level of education (such as differentiation between colors and basic word recognition and numeracy), but most continued to focus solely on the provision of basic needs of food, clothing, and shelter. Conditions in such institutions varied widely, but the support provided was generally non-individualized, with aberrant behavior and low levels of economic productivity regarded as a burden to society. Heavy tranquilization and assembly line methods of support were the norm, and the medical model of disability prevailed. Services were provided based on the relative ease to the provider, not based on the needs of the individual.

www.numerons.in

In the late 19th century, in response to Charles Darwin's On the Origin of Species, Francis Galton proposed selective breeding of humans to reduce intellectual disabilities. Early in the twentieth century the eugenics movement became popular throughout the world. This led to the forced sterilization and prohibition of marriage in most of the developed world and later used by Hitler as rationale for the mass murder of mentally challenged individuals during the holocaust. Eugenics was later abandoned as an evil violation of human rights, and the practice of forced sterilization and prohibition from marriage was discontinued by most of the developed world by the mid 20th century.

In 1905, Alfred Binet produced the first standardized test for measuring intelligence in children.

Although ancient Roman law had declared people with mental retardation to be incapable of the deliberate intent to harm that was necessary for a person to commit a crime, during the 1920s, Western society believed they were morally degenerate.

www.numerons.in

Ignoring the prevailing attitude, Civitans adopted service to the developmentally disabled as a major organizational emphasis in 1952. Their earliest efforts included workshops for special education teachers and daycamps for disabled children, all at a time when such

training and programs were almost nonexistent. The segregation of people with developmental disabilities wasn't widely questioned by academics or policy-makers until the 1969 publication of Wolf Wolfensberger's seminal work "The Origin and Nature of Our Institutional Models", drawing on some of the ideas proposed by SG Howe 100 years earlier. This book posited that society characterizes people with disabilities as deviant, sub-human and burdens of charity, resulting in the adoption of that "deviant" role. Wolfensberger argued that this dehumanization, and the segregated institutions that result from it, ignored the potential productive contributions that all people can make to society. He pushed for a shift in policy and practice that recognized the human needs of "retardates" and provided the same basic human rights as for the rest of the population.

www.numerons.in

The publication of this book may be regarded as the first move towards the widespread adoption of the social model of disability in regard to these types of disabilities, and was the impetus for the development of government strategies for desegregation. Successful lawsuits against governments and an increasing awareness of human rights and self-advocacy also contributed to this process, resulting in the passing in the U.S. of the Civil Rights of Institutionalized Persons Act in 1980.

From the 1960s to the present, most states have moved towards the elimination of segregated institutions. Normalization and deinstitutionalization are dominant. Along with the work of Wolfensberger and others including Gunnar and Rosemary Dybwad, a number of scandalous revelations around the horrific conditions within state institutions created public outrage that led to change to a more community-based method of providing services.

www.numerons.in

By the mid-1970s, most governments had committed to de-institutionalization, and had started preparing for the wholesale movement of people into the general community, in line with the principles of normalization. In most countries, this was essentially complete by the late 1990s, although the debate over whether or not to close institutions persists in some states, including Massachusetts.

In the past, lead poisoning and infectious diseases were significant causes of intellectual disabilities. Some causes of mental retardation are decreasing, as medical advances, such as vaccination, increases. Other causes are increasing, perhaps due to rising maternal age, which is associated with several syndromic forms of mental retardation.

Along with the changes in terminology, and the downward drift in acceptability of the old terms, institutions of all kinds have had to repeatedly change their names. This affects the names of schools, hospitals, societies, government departments, and academic journals. For example, the Midlands Institute of Mental Subnormality became the British Institute of Mental Handicap and is now the British Institute of Learning Disability. This phenomenon is shared with mental health and motor disabilities, and seen to a lesser degree in sensory disabilities.

www.numerons.in

History of the terminology

Several traditional terms denoting varying degrees of mental deficiency long predate psychiatry. All terms have been subjected to the euphemism treadmill. In common usage, these terms are simple forms of abuse. They are often encountered in old documents such as books, academic papers, and census forms (for example, the British census of 1901 has a column heading including the terms imbecile and feeble-minded).

Negative connotations associated with these numerous terms for mental retardation reflect society's attitude about the condition. There are competing desires among elements of society, some of whom seek neutral medical terms, and others who want to use such terms as weapons with which to abuse people.

www.numerons.in

Today, the term retarded is slowly being replaced by new words like special or challenged. The term developmental delay is popular among caretakers and parents of individuals with mental retardation. Using the word delay is preferred over disability by many people, because delay suggests that a person is slowly reaching his or her full potential, rather than someone who has been disabled.

Usage has changed over the years, and differed from country to country, which needs to be borne in mind when looking at older books and papers. For example, mental retardation in some contexts covers the whole field, but previously applied to what is now the mild MR group. Feeble-minded used to mean mild MR in the UK, and once applied in the US to the whole field. "Borderline MR" is not currently defined, but the term may be used to apply to people with IQs in the 70s. People with IQs of 70 to 85 used to be eligible for special consideration in the US public education system on grounds of mental retardation.

www.numerons.in

- Cretin is the oldest and comes from a dialectal French word for Christian. The implication was that people with significant intellectual or developmental disabilities were "still human" (or "still Christian") and deserved to be treated with basic human dignity. Individuals with the condition were considered to be incapable of sinning, thus "christ-like" in their disposition. This term is not used in scientific endeavors since the middle of the 20th century and is generally considered a term of abuse. "Cretinism" is also used as an obsolescent term to refer to the condition of congenital hypothyroidism, in which there is some degree of mental retardation.
- Amentia has a long history, mostly associated with dementia. The difference between amentia and dementia was originally defined by time of onset. Amentia was the term used to describe an individual who developed deficits in mental functioning early in life, while dementia described individuals who develop mental deficiencies as adults. During the 1890s, amentia was used to describe someone who was born with mental deficiencies. By 1912, ament was a classification lumping "idiots, imbeciles, and feeble minded" individuals in a category separate from a dement classification, in which the onset is later in life.

www.numerons.in

- Idiot indicated the greatest degree of intellectual disability, where the mental age is two years or less, and the person cannot guard himself or herself against common physical dangers. The term was gradually replaced by the term profound mental retardation.

- Imbecile indicated an intellectual disability less extreme than idiocy and not necessarily inherited. It is now usually subdivided into two categories, known as severe mental retardation and moderate mental retardation.
- Moron was defined by the American Association for the Study of the Feeble-minded in 1910, following work by Henry H. Goddard, as the term for an adult with a mental age between eight and twelve; mild mental retardation is now the term for this condition. Alternative definitions of these terms based on IQ were also used. This group was known in UK law from 1911 to 1959/60 as feeble-minded.
- Mongolism was a medical term used to identify someone with Down syndrome. The Mongolian People's Republic requested that the medical community cease use of the term as a description of mental retardation. Their request was granted in the 1960s, when the World Health Organization agreed that the term should cease being used within the medical community.
- In the field of special education, educable (or "educable mentally retarded") refers to MR students with IQs of approximately 50–75 who can progress academically to a late elementary level. Trainable (or "trainable mentally retarded") refers to students whose IQs fall below 50 but who are still capable of learning personal hygiene and other living skills in a sheltered setting, such as a group home. In many areas, these terms have been replaced by use of "moderate" and "severe" mental retardation. While the names change, the meaning stays roughly the same in practice.
- Retarded comes from the Latin retardare, "to make slow, delay, keep back, or hinder." The term was recorded in 1426 as a "fact or action of making slower in movement or time." The first record of retarded in relation to being mentally slow was in 1895. The term retarded was used to replace terms like idiot, moron, and imbecile because retarded was not (then) a derogatory term. By the 1960s, however, the term had taken on a partially derogatory meaning as well. The noun retard is particularly seen as pejorative; as of 2010, the Special Olympics, Best Buddies and over 100 other organizations are striving to help eliminate the use of the "r-word" (analogous to the "n-word") in everyday conversation.

www.numerons.in

The term mental retardation is a diagnostic term denoting the group of disconnected categories of mental functioning such as idiot, imbecile, and moron derived from early IQ tests, which acquired pejorative connotations in popular discourse. The term mental retardation acquired pejorative and shameful connotations over the last few decades due to the use of the words retarded and retard as insults. This may have contributed to its replacement with euphemisms such as mentally challenged or intellectually disabled. While developmental disability includes many other disorders (see below), developmental disability and developmental delay (for people under the age of 18), are generally considered more acceptable terms than mental retardation.

United States

www.numerons.in

In North America mental retardation is subsumed into the broader term developmental disability, which also includes epilepsy, autism, cerebral palsy and other disorders that develop during the developmental period (birth to age 18). Because service provision is tied to the designation developmental disability, it is used by many parents, direct support

professionals, and physicians. In the United States, however, in school-based settings, the more specific term mental retardation is still typically used, and is one of 13 categories of disability under which children may be identified for special education services under Public Law 108-446.

The phrase intellectual disability is increasingly being used as a synonym for people with significantly below-average cognitive ability. These terms are sometimes used as a means of separating general intellectual limitations from specific, limited deficits as well as indicating that it is not an emotional or psychological disability. Intellectual disability may also used to describe the outcome of traumatic brain injury or lead poisoning or dementing conditions such as Alzheimer's disease. It is not specific to congenital disorders such as Down syndrome.

www.numerons.in

The American Association on Mental Retardation continued to use the term mental retardation until 2006. In June 2006 its members voted to change the name of the organization to the "American Association on Intellectual and Developmental Disabilities," rejecting the options to become the AAID or AADD. Part of the rationale for the double name was that many members worked with people with pervasive developmental disorders, most of whom do not have mental retardation.

United Kingdom

In the UK, mental handicap had become the common medical term, replacing mental subnormality in Scotland and mental deficiency in England and Wales, until Stephen Dorrell, Secretary of State for Health for the United Kingdom from 1995–97, changed the NHS's designation to learning disability. The new term is not yet widely understood, and is often taken to refer to problems affecting schoolwork (the American usage), which are known in the UK as "learning difficulties." British social workers may use "learning difficulty" to refer to both people with MR and those with conditions such as dyslexia. In education, "learning difficulties" is applied to a wide range of conditions: "specific learning difficulty" may refer to dyslexia, dyscalculia or dyspraxia, while "moderate learning difficulties", "severe learning difficulties" and "profound learning difficulties" refer to more significant impairments.

www.numerons.in

In England and Wales between 1983 and 2008 the Mental Health Act 1983 defined "mental impairment" and "severe mental impairment" as "a state of arrested or incomplete development of mind which includes significant/severe impairment of intelligence and social functioning and is associated with abnormally aggressive or seriously irresponsible conduct on the part of the person concerned." As behavior was involved, these were not necessarily permanent conditions: they were defined for the purpose of authorizing detention in hospital or guardianship. The term mental impairment was removed from the Act in November 2008, but the grounds for detention remained. However, English statute law uses mental impairment elsewhere in a less well-defined manner—e.g. to allow exemption from taxes—implying that mental retardation without any behavioral problems is what is meant.

A BBC poll conducted in the United Kingdom came to the conclusion that 'retard' was the most offensive disability-related word. On the reverse side of that, when a contestant on Celebrity Big Brother live used the phrase "walking like a retard", despite complaints from the public and the charity Mencap, the communications regulator Ofcom did not uphold the complaint saying "it was not used in an offensive context [...] and had been used light-heartedly". It was however noted that two previous similar complaints from other shows were upheld.

www.numerons.in

Australia

The term mental retardation is still used in Australia; however, intellectual disability is now the preferred and more commonly used descriptor.

Society and culture

People with such disabilities are often not seen as full citizens of society. Person-centered planning and approaches are seen as methods of addressing the continued labelling and exclusion of socially devalued people, such as people with disabilities, encouraging a focus on the person as someone with capacities and gifts, as well as support needs. The self-advocacy movement promotes the right of self-determination and self-direction by people with intellectual disabilities, which means allowing people with intellectual disabilities to make decisions about their own lives.

Until the middle of the 20th century, people with intellectual disabilities were routinely excluded from public education, or educated away from other typically developing children. Compared to students with intellectual disabilities who were segregated in special schools, students with intellectual disabilities who are mainstreamed or included in regular classrooms report similar levels of stigma and social self-conception, but more ambitious plans for employment.

www.numerons.in

As adults, people with intellectual disabilities may live independently, with family members, or in different types of institutions organized to support people with intellectual disabilities. About 8% of people with mental retardation live in an institution or group home.

In the US, the average lifetime cost of mental retardation amounts to $1,014,000 per person with mental retardation, in 2003 US dollars. This is slightly more than the costs associated with cerebral palsy, and double that associated with serious vision or hearing impairments. Of that $1,014,000, about 14% is due to increased medical expenses (not including what is normally incurred by a person with mental retardation), 10% is due to direct non-medical expenses, such as the excess cost of special education compared to standard schooling, and 76% is indirect costs accounting for reduced productivity and shortened lifespans. Some expenses, such as costs associated with being a family caregiver or living in a group home, were excluded from this calculation.

www.numerons.in

Abusive terms for intellectual deficits are common insults, and are most commonly applied to non-disabled people. For example, in the 1964 movie Becket, King Henry II calls his son and heir a "cretin." Mental health professionals discourage use of these terms. The abbreviation retard or tard is still used as a generic insult. A BBC survey in 2003 ranked retard as the most offensive disability-related word, ahead of terms such as spastic (not considered offensive in America) and mong. A campaign led by people with intellectual disabilities and the Special Olympics to eliminate the "R-word" has resulted in federal legislation to replace the term mentally retarded with the term intellectual disability in some federal statutes.

www.numerons.in

Attention deficit hyperactivity disorder

Attention deficit hyperactivity disorder (ADHD or AD/HD or ADD) is a developmental disorder. It is primarily characterized by "the co-existence of attentional problems and hyperactivity, with each behavior occurring infrequently alone" and symptoms starting before seven years of age.

A boy not paying attention in class

ADHD is the most commonly studied and diagnosed psychiatric disorder in children, affecting about 3 to 5 percent of children globally and diagnosed in about 2 to 16 percent of school aged children. It is a chronic disorder with 30 to 50 percent of those individuals diagnosed in childhood continuing to have symptoms into adulthood. Adolescents and adults with ADHD tend to develop coping mechanisms to compensate for some or all of their impairments. It is estimated that 4.7 percent of American adults live with ADHD. Standardized rating scales such as WHO's Adult ADHD Self-Report Scale can be used for ADHD screening and assessment of the disorder's symptoms severity.

ADHD is diagnosed two to four times more frequently in boys than in girls, though studies suggest this discrepancy may be partially due to subjective bias of referring teachers. ADHD management usually involves some combination of medications, behavior modifications, lifestyle changes, and counseling. Its symptoms can be difficult to differentiate from other disorders, increasing the likelihood that the diagnosis of ADHD will be missed. Additionally, most clinicians have not received formal training in the assessment and treatment of ADHD, particularly in adult patients.

www.numerons.in

ADHD and its diagnosis and treatment have been considered controversial since the 1970s. The controversies have involved clinicians, teachers, policymakers, parents and the media. Topics include the actuality of the disorder, its causes, and the use of stimulant medications in its treatment. Most healthcare providers accept that ADHD is a genuine disorder with debate in the scientific community centering mainly around how it is diagnosed and treated. The American Medical Association concluded in 1998 that the diagnostic criteria for ADHD are based on extensive research and, if applied appropriately, lead to the diagnosis with high reliability.

www.numerons.in

Classification

ADHD may be seen as one or more continuous traits found normally throughout the general population. It is a developmental disorder in which certain traits such as impulse control lag in development. Using magnetic resonance imaging of the prefrontal cortex, this developmental lag has been estimated to range from 3 to 5 years. A diagnosis of ADHD does not, however, imply a neurological disease. ADHD is classified as a disruptive behavior disorder along with oppositional defiant disorder, conduct disorder and antisocial disorder.

ADHD has three subtypes:

- Predominantly hyperactive-impulsive
  - Most symptoms (six or more) are in the hyperactivity-impulsivity categories.
  - Fewer than six symptoms of inattention are present, although inattention may still be present to some degree.
- Predominantly inattentive
  - The majority of symptoms (six or more) are in the inattention category and fewer than six symptoms of hyperactivity-impulsivity are present, although hyperactivity-impulsivity may still be present to some degree.
  - Children with this subtype are less likely to act out or have difficulties getting along with other children. They may sit quietly, but they are not paying attention to what they are doing. Therefore, the child may be overlooked, and parents and teachers may not notice symptoms of ADHD.
- Combined hyperactive-impulsive and inattentive
  - Six or more symptoms of inattention and six or more symptoms of hyperactivity-impulsivity are present.
  - Most children with ADHD have the combined type.

www.numerons.in

Signs and symptoms

www.numerons.in

Inattention, hyperactivity, and impulsivity are the key behaviors of ADHD. The symptoms of ADHD are especially difficult to define because it is hard to draw the line at where normal levels of inattention, hyperactivity, and impulsivity end and clinically significant levels requiring intervention begin. To be diagnosed with ADHD, symptoms must be

observed in two different settings for six months or more and to a degree that is greater than other children of the same age.

The symptom categories of ADHD in children yield three potential classifications of ADHD—predominantly inattentive type, predominantly hyperactive-impulsive type, or combined type if criteria for both subtypes are met::p.4

Predominantly inattentive type symptoms may include:

www.numerons.in

- Be easily distracted, miss details, forget things, and frequently switch from one activity to another
- Have difficulty maintaining focus on one task
- Become bored with a task after only a few minutes, unless doing something enjoyable
- Have difficulty focusing attention on organizing and completing a task or learning something new or trouble completing or turning in homework assignments, often losing things (e.g., pencils, toys, assignments) needed to complete tasks or activities
- Not seem to listen when spoken to
- Daydream, become easily confused, and move slowly
- Have difficulty processing information as quickly and accurately as others
- Struggle to follow instructions.

Predominantly hyperactive-impulsive type symptoms may include:

www.numerons.in

- Fidget and squirm in their seats
- Talk nonstop
- Dash around, touching or playing with anything and everything in sight
- Have trouble sitting still during dinner, school, and story time
- Be constantly in motion
- Have difficulty doing quiet tasks or activities.

and also these manifestations primarily of impulsivity:

- Be very impatient
- Blurt out inappropriate comments, show their emotions without restraint, and act without regard for consequences
- Have difficulty waiting for things they want or waiting their turns in games

Most people exhibit some of these behaviors, but not to the degree where such behaviors significantly interfere with a person's work, relationships, or studies—and in the absence of significant interference or impairment, a diagnosis of ADHD is normally not appropriate. The core impairments are consistent even in different cultural contexts.

www.numerons.in

Symptoms may persist into adulthood for up to half of children diagnosed with ADHD. Estimating this is difficult as there are no official diagnostic criteria for ADHD in adults. ADHD in adults remains a clinical diagnosis. The signs and symptoms may differ from those

during childhood and adolescence due to the adaptive processes and avoidance mechanisms learned during the process of socialisation.

A 2009 study found that children with ADHD move around a lot because it helps them stay alert enough to complete challenging tasks.

Comorbid disorders

www.numerons.in

ADHD may accompany other disorders such as anxiety or depression. Such combinations can greatly complicate diagnosis and treatment. Academic studies and research in private practice suggest that depression in ADHD appears to be increasingly prevalent in children as they get older, with a higher rate of increase in girls than in boys, and to vary in prevalence with the subtype of ADHD. Where a mood disorder complicates ADHD it would be prudent to treat the mood disorder first, but parents of children who have ADHD often wish to have the ADHD treated first, because the response to treatment is quicker.

Inattention and "hyperactive" behavior are not the only problems in children with ADHD. ADHD exists alone in only about 1/3 of the children diagnosed with it. Many co-existing conditions require other courses of treatment and should be diagnosed separately instead of being grouped in the ADHD diagnosis. Some of the associated conditions are:

- Oppositional defiant disorder (35%) and conduct disorder (26%) which both are characterized by antisocial behaviors such as stubbornness, aggression, frequent temper tantrums, deceitfulness, lying, or stealing, inevitably linking these comorbid disorders with antisocial personality disorder (ASPD); about half of those with hyperactivity and ODD or CD develop ASPD in adulthood.
- Borderline personality disorder, which was according to a study on 120 female psychiatric patients diagnosed and treated for BPD associated with ADHD in 70 percent of those cases.
- Primary disorder of vigilance, which is characterized by poor attention and concentration, as well as difficulties staying awake. These children tend to fidget, yawn and stretch and appear to be hyperactive in order to remain alert and active.
- Mood disorders. Boys diagnosed with the combined subtype have been shown likely to suffer from a mood disorder.
- Bipolar disorder. As many as 25 percent of children with ADHD have bipolar disorder. Children with this combination may demonstrate more aggression and behavioral problems than those with ADHD alone.
- Anxiety disorder, which has been found to be common in girls diagnosed with the inattentive subtype of ADHD.
- Obsessive-compulsive disorder. OCD is believed to share a genetic component with ADHD and shares many of its characteristics.

www.numerons.in

Cause

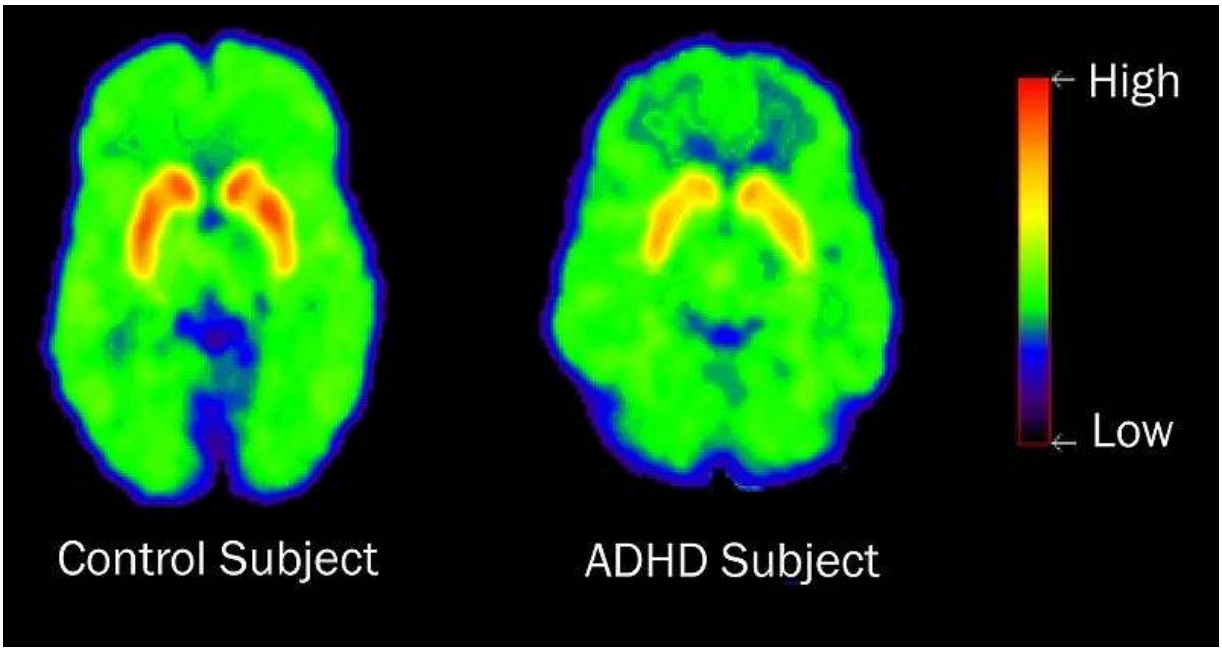
The specific causes of ADHD are not known. There are, however, a number of factors that may contribute to, or exacerbate ADHD. They include genetics, diet and the social and physical environments.

Genetics

Twin studies indicate that the disorder is highly heritable and that genetics are a factor in about 75 percent of all cases. Hyperactivity also seems to be primarily a genetic condition; however, other causes do have an effect.

www.numerons.in

Researchers believe that a large majority of ADHD cases arise from a combination of various genes, many of which affect dopamine transporters. Candidate genes include α2A adrenergic receptor, dopamine transporter, dopamine receptors D2/D3, dopamine beta-hydroxylase monoamine oxidase A, catecholamine-methyl transferase, serotonin transporter promoter (SLC6A4), 5HT2A receptor, 5HT1B receptor, the 10-repeat allele of the DAT1 gene, the 7-repeat allele of the DRD4 gene, and the dopamine beta hydroxylase gene (DBH TaqI). A common variant of a gene called LPHN3 is estimated to be responsible for about 9% of the incidence of ADHD, and ADHD cases where this gene is present are particularly responsive to stimulant medication.



PET scan: ADHD brains dopamine transporters

The broad selection of targets indicates that ADHD does not follow the traditional model of "a simple genetic disease" and should therefore be viewed as a complex interaction among genetic and environmental factors. Even though all these genes might play a role, to date no single gene has been shown to make a major contribution to ADHD.

www.numerons.in

Evolutionary theories

The hunter vs. farmer theory is a hypothesis proposed by author Thom Hartmann about the origins of ADHD. The theory proposes that hyperactivity may be an adaptive behavior in pre-modern humans and that those with ADHD retain some of the older "hunter" characteristics associated with early pre-agricultural human society. According to this theory, individuals with ADHD may be more adept at searching and seeking and less adept at staying put and managing complex tasks over time. Further evidence showing hyperactivity may be evolutionarily beneficial was put forth in 2006 in a study which found it may carry specific benefits for certain forms of ancient society. In these societies, those with ADHD are hypothesized to have been more proficient in tasks involving risk or competition (i.e. hunting, mating rituals, etc.). A genetic variant associated with ADHD (DRD4 48bp VNTR 7R allele), has been found to be at higher frequency in more nomadic populations and those with more of a history of migration. Consistent with this, another group of researchers observed that the health status of nomadic Ariaal men was higher if they had the ADHD associated genetic variant (7R alleles). However in recently sedentary (non-nomadic) Ariaal those with 7R alleles seemed to have slightly worse health.

www.numerons.in

Environmental

Twin studies to date have suggested that approximately 9 to 20 percent of the variance in hyperactive-impulsive-inattentive behavior or ADHD symptoms can be attributed to nonshared environmental (nongenetic) factors. Environmental factors implicated include alcohol and tobacco smoke exposure during pregnancy and environmental exposure to lead in very early life. The relation of smoking to ADHD could be due to nicotine causing hypoxia (lack of oxygen) to the fetus in utero. It could also be that women with ADHD are more likely to smoke and therefore, due to the strong genetic component of ADHD, are more likely to have children with ADHD. Complications during pregnancy and birth—including premature birth—might also play a role. ADHD patients have been observed to have higher than average rates of head injuries; however, current evidence does not indicate that head injuries are the cause of ADHD in the patients observed. Infections during pregnancy, at birth, and in early childhood are linked to an increased risk of developing ADHD. These include various viruses (measles, varicella, rubella, enterovirus 71) and streptococcal bacterial infection.

www.numerons.in

A 2007 study linked the organophosphate insecticide chlorpyrifos, which is used on some fruits and vegetables, with delays in learning rates, reduced physical coordination, and behavioral problems in children, especially ADHD.

A 2010 study found that pesticide exposure is strongly associated with an increased risk of ADHD in children. Researchers analyzed the levels of organophosphate residues in the urine of more than 1,100 children aged 8 to 15 years old, and found that those with the highest levels of dialkyl phosphates, which are the breakdown products of organophosphate pesticides, also had the highest incidence of ADHD. Overall, they found a 35 percent increase in the odds of developing ADHD with every 10-fold increase in urinary concentration of the pesticide residues. The effect was seen even at the low end of exposure: children who had any detectable, above-average level of pesticide metabolite in

www.numerons.in

their urine were twice as likely as those with undetectable levels to record symptoms of ADHD.

Three government-funded longitudinal studies from 2010 and 2011 examined environmental exposure to organophosphate pesticides between pregnancy and grade school. Although the studies varied in techniques to measure pesticide exposure, they reached similar conclusions. Children exposed to higher levels of organophosphates during pregnancy were more likely to have lower IQs and problems focusing or solving problems. One study suggested that genetics play a strong role in whether exposure to organophosphates causes damage. Two studies found higher rates of ADHD diagnosis among children exposed to higher levels of organophosphate pesticides.

www.numerons.in

Diet

A study published in The Lancet in 2007 found a link between children's ingestion of many commonly used artificial food colors, the preservative sodium benzoate and hyperactivity. In response to these findings, the British government took prompt action. According to the Food Standards Agency, the food regulatory agency in the UK, food manufacturers are being encouraged to voluntarily phase out the use of most artificial food colors by the end of 2009. Following the FSA's actions, the European Commission ruled that any food products containing the "Southampton Six" (The contentious colourings are: sunset yellow FCF (E110), quinoline yellow (E104), carmoisine (E122), allura red (E129), tartrazine (E102) and ponceau 4R (E124)) must display warning labels on their packaging by 2010. In the US, little has been done to curb food manufacturer's use of specific food colors, despite the new evidence presented by the Southampton study. However, the existing US Food Drug and Cosmetic Act had already required that artificial food colors be approved for use, that they must be given FD&C numbers by the FDA, and the use of these colors must be indicated on the package. This is why food packaging in the USA may state something like: "Contains FD&C Red #40." As of March 2011, the FDA was evaluating the scientific evidence of a link between dyes and ADHD; a preliminary analysis found there was no link.
Social

www.numerons.in

The World Health Organization states that the diagnosis of ADHD can represent family dysfunction or inadequacies in the educational system rather than individual psychopathology. Other researchers believe that relationships with caregivers have a profound effect on attentional and self-regulatory abilities. A study of foster children found that a high number of them had symptoms closely resembling ADHD. Researchers have found behavior typical of ADHD in children who have suffered violence and emotional abuse. Furthermore, Complex Post Traumatic Stress Disorder can result in attention problems that can look like ADHD. ADHD is also considered to be related to sensory integration dysfunction.

A 2010 article by CNN suggests that there is an increased risk for internationally adopted children to develop mental health disorders, such as ADHD and ODD. The risk may be related to the length of time the children spent in an orphanage, especially if they were neglected or abused. Many of these families who adopted the affected children feel

overwhelmed and frustrated, since managing their children may entail more responsibilities than originally anticipated. The adoption agencies may be aware of the child's behavioral history, but decide to withhold the information prior to the adoption. This in turn has resulted in some parents suing adoption agencies, in the abuse of children, and even in the relinquishment of the child.

Neurodiversity

www.numerons.in

Proponents of the neurodiversity theory assert that atypical (neurodivergent) neurological development is a normal human difference that is to be tolerated and respected just like any other human difference. Social critics argue that while biological factors may play a large role in difficulties with sitting still in class and/or concentrating on schoolwork in some children, these children could have failed to integrate others' social expectations of their behavior for a variety of other reasons. As genetic research into ADHD proceeds, it may become possible to integrate this information with the neurobiology in order to distinguish disability from varieties of normal or even exceptional functioning in people along the same spectrum of attention differences.

Social construct theory of ADHD

Social construction theory states that it is societies that determine where the line between normal and abnormal behavior is drawn. Thus society members including physicians, parents, teachers, and others are the ones who determine which diagnostic criteria are applied and thus determine the number of people affected. This is exemplified in the fact that the DSM IV arrives at levels of ADHD three to four times higher than those obtained with use of the ICD 10. Thomas Szasz, an extreme proponent of this theory, has gone so far as to state that ADHD was "invented and not discovered."

www.numerons.in

Low arousal theory

According to the low arousal theory, people with ADHD need excessive activity as self-stimulation because of their state of abnormally low arousal. The theory states that those with ADHD cannot self-moderate, and their attention can only be gained by means of environmental stimuli, which in turn results in disruption of attentional capacity and an increase in hyperactive behaviour.

Without enough stimulation coming from the environment, an ADHD child will create it him or herself by walking around, fidgeting, talking, etc. This theory also explains why stimulant medications have high success rates and can induce a calming effect at therapeutic dosages among children with ADHD. It establishes a strong link with scientific data that ADHD is connected to abnormalities with the neurochemical dopamine and a powerful link with low-stimulation PET scan results in ADHD subjects.

www.numerons.in

Pathophysiology

The pathophysiology of ADHD is unclear and there are a number of competing theories. Research on children with ADHD has shown a general reduction of brain volume, but with a proportionally greater reduction in the volume of the left-sided prefrontal cortex. These findings suggest that the core ADHD features of inattention, hyperactivity, and impulsivity may reflect frontal lobe dysfunction, but other brain regions particularly the cerebellum have also been implicated. Neuroimaging studies in ADHD have not always given consistent results and as of 2008 are only used for research not diagnostic purposes. A 2005 review of published studies involving neuroimaging, neuropsychological genetics, and neurochemistry found converging lines of evidence to suggest that four connected frontostriatal regions play a role in the pathophysiology of ADHD: The lateral prefrontal cortex, dorsal anterior cingulate cortex, caudate, and putamen.

www.numerons.in

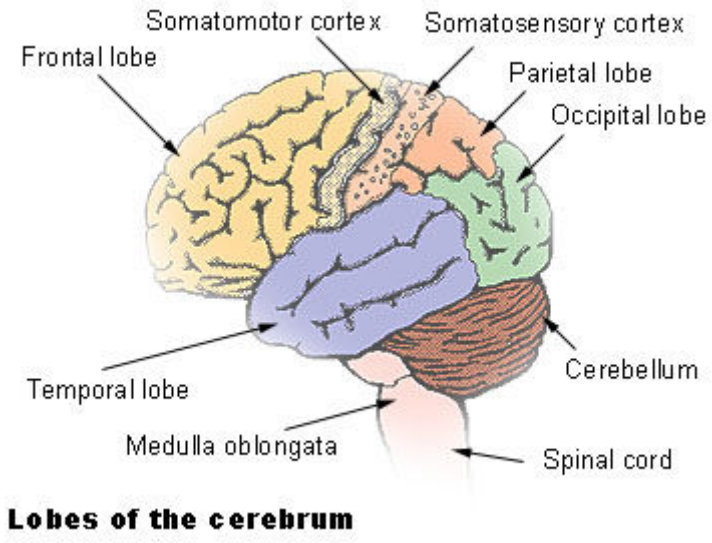


Diagram of the human brain

In one study a delay in development of certain brain structures by an average of three years occurred in ADHD elementary school aged patients. The delay was most prominent in the frontal cortex and temporal lobe, which are believed to be responsible for the ability to control and focus thinking. In contrast, the motor cortex in the ADHD patients was seen to mature faster than normal, suggesting that both slower development of behavioral control and advanced motor development might be required for the fidgetiness that characterizes ADHD. It should be noted that stimulant medication itself may affect growth factors of the central nervous system.

The same laboratory had previously found involvement of the "7-repeat" variant of the dopamine D4 receptor gene, which accounts for about 30 percent of the genetic risk for ADHD, in unusual thinness of the cortex of the right side of the brain; however, in contrast to other variants of the gene found in ADHD patients, the region normalized in thickness during the teen years in these children, coinciding with clinical improvement.

www.numerons.in

Additionally, SPECT scans found people with ADHD to have reduced blood circulation (indicating low neural activity), and a significantly higher concentration of dopamine

transporters in the striatum which is in charge of planning ahead. A study by the U.S. Department of Energy's Brookhaven National Laboratory in collaboration with Mount Sinai School of Medicine in New York suggest that it is not the dopamine transporter levels that indicate ADHD, but the brain's ability to produce neurotransmitters like dopamine itself. The study was done by injecting 20 ADHD subjects and 25 control subjects with a radiotracer that attaches itself to dopamine transporters. The study found that it was not the transporter levels that indicated ADHD, but the dopamine itself. ADHD subjects showed lower levels of dopamine (hypodopaminergia) across the board. They speculated that since ADHD subjects had lower levels of dopamine to begin with, the number of transporters in the brain was not the telling factor. In support of this notion, plasma homovanillic acid, an index of dopamine levels, was found to be inversely related not only to childhood ADHD symptoms in adult psychiatric patients, but to "childhood learning problems" in healthy subjects as well. One interpretation of dopamine pathway tracers is that the biochemical "reward" mechanism works for those with ADHD only when the task performed is inherently motivating; low levels of dopamine raise the threshold at which someone can maintain focus on a task which is otherwise boring. Neuroimaging studies also found that neurotransmitters level (e.g. dopamine and serotonin) in the synaptic cleft goes down during depression.

www.numerons.in

A 1990 PET scan study by Alan J. Zametkin et al. found that global cerebral glucose metabolism was 8 percent lower in medication-naive adults who had been hyperactive since childhood. Further studies found that chronic stimulant treatment had little effect on global glucose metabolism, a 1993 study in girls failed to find a decreased global glucose metabolism, but found significant differences in glucose metabolism in 6 specific regions of the brains of ADHD girls as compared to control subjects. The study also found that differences in one specific region of the frontal lobe were statistically correlated with symptom severity. A further study in 1997 also failed to find global differences in glucose metabolism, but similarly found differences in glucose normalization in specific regions of the brain. The 1997 study also noted that their findings were somewhat different than those in the 1993 study, and concluded that sexual maturation may have played a role in this discrepancy. The significance of the research by Zametkin has not been determined and neither his group nor any other has been able to replicate the 1990 results.

www.numerons.in

Critics, such as Jonathan Leo and David Cohen, who reject the characterization of ADHD as a disorder, contend that the controls for stimulant medication usage were inadequate in some lobar volumetric studies which makes it impossible to determine whether ADHD itself or psychotropic medication used to treat ADHD is responsible for the decreased thickness observed in certain brain regions. While the main study in question used age-matched controls, it did not provide information on height and weight of the subjects. These variables it has been argued could account for the regional brain size differences rather than ADHD itself. They believe many neuroimaging studies are oversimplified in both popular and scientific discourse and given undue weight despite deficiencies in experimental methodology.

www.numerons.in

Diagnosis

ADHD is diagnosed via a psychiatric assessment; to rule out other potential causes or comorbidities, physical examination, radiological imaging, and laboratory tests may be used.

In North America, the DSM-IV criteria are often the basis for a diagnosis, while European countries usually use the ICD-10. If the DSM-IV criteria are used, rather than the ICD-10, a diagnosis of ADHD is 3–4 times more likely. Factors other than those within the DSM or ICD however have been found to affect the diagnosis in clinical practice. A child's social and school environment as well as academic pressures at school are likely to be of influence.

www.numerons.in

Many of the symptoms of ADHD occur from time to time in everyone; in patients with ADHD, the frequency of these symptoms is greater and patients' lives are significantly impaired. Impairment must occur in multiple settings to be classified as ADHD. As with many other psychiatric and medical disorders, the formal diagnosis is made by a qualified professional in the field based on a set number of criteria. In the USA these criteria are laid down by the American Psychiatric Association in their Diagnostic and Statistical Manual of Mental Disorders (DSM-IV), 4th edition. Based on the DSM-IV criteria listed below, three types of ADHD are classified:

- ADHD, Combined Type: if both criteria 1A and 1B are met for the past 6 months
- ADHD Predominantly Inattentive Type: if criterion 1A is met but criterion 1B is not met for the past six months
- ADHD, Predominantly Hyperactive-Impulsive Type: if criterion 1B is met but criterion 1A is not met for the past six months.

www.numerons.in

The previously used term ADD expired with the most recent revision of the DSM. Consequently, ADHD is the current nomenclature used to describe the disorder as one distinct disorder which can manifest itself as being a primary deficit resulting in hyperactivity/impulsivity (ADHD, predominately hyperactive-impulsive type) or inattention (ADHD predominately inattentive type) or both (ADHD combined type).

DSM-IV

IA. Six or more of the following signs of inattention have been present for at least 6 months to a point that is disruptive and inappropriate for developmental level:

Inattention:

- Often does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
- Often has trouble keeping attention on tasks or play activities.
- Often does not seem to listen when spoken to directly.
- Often does not follow instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).
- Often has trouble organizing activities.

www.numerons.in

- Often avoids, dislikes, or doesn't want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework).
- Often loses things needed for tasks and activities (such as toys, school assignments, pencils, books, or tools).
- Is often easily distracted.
- Often forgetful in daily activities.

IB. Six or more of the following signs of hyperactivity-impulsivity have been present for at least 6 months to an extent that is disruptive and inappropriate for developmental level:

www.numerons.in

Hyperactivity:

- Often fidgets with hands or feet or squirms in seat.
- Often gets up from seat when remaining in seat is expected.
- Often runs about or climbs when and where it is not appropriate (adolescents or adults may feel very restless).
- Often has trouble playing or enjoying leisure activities quietly.
- Is often "on the go" or often acts as if "driven by a motor".
- Often talks excessively.

Impulsiveness:

- Often blurts out answers before questions have been finished.
- Often has trouble waiting one's turn.
- Often interrupts or intrudes on others (example: butts into conversations or games).

www.numerons.in

II. Some signs that cause impairment were present before age 7 years.

III. Some impairment from the signs is present in two or more settings (such as at school/work and at home).

IV. There must be clear evidence of significant impairment in social, school, or work functioning.

V. The signs do not happen only during the course of a Pervasive Developmental Disorder, Schizophrenia, or other Psychotic Disorder. The signs are not better accounted for by another mental disorder (such as Mood Disorder, Anxiety Disorder, Dissociative Identity Disorder, or a Personality Disorder).

ICD-10

www.numerons.in

In the tenth edition of the International Statistical Classification of Diseases and Related Health Problems (ICD-10) the signs of ADHD are given the name "Hyperkinetic disorders". When a conduct disorder (as defined by ICD-10) is present, the condition is referred to as "Hyperkinetic conduct disorder". Otherwise the disorder is classified as "Disturbance of

Activity and Attention", "Other Hyperkinetic Disorders" or "Hyperkinetic Disorders, Unspecified". The latter is sometimes referred to as, "Hyperkinetic Syndrome".

Other guidelines

The American Academy of Pediatrics Clinical Practice Guideline for children with ADHD emphasizes that a reliable diagnosis is dependent upon the fulfillment of three criteria:

www.numerons.in

- The use of explicit criteria for the diagnosis using the DSM-IV-TR.
- The importance of obtaining information about the child's signs in more than one setting.
- The search for coexisting conditions that may make the diagnosis more difficult or complicate treatment planning.

All three criteria are determined using the patient's history given by the parents, teachers and/or the patient.

Adults often continue to be impaired by ADHD. Adults with ADHD are diagnosed under the same criteria, including the stipulation that their signs must have been present prior to the age of seven. Adults face some of their greatest challenges in the areas of self-control and self-motivation, as well as executive functioning, usually having more signs of inattention and fewer of hyperactivity or impulsiveness than children do.

The American Academy of Child Adolescent Psychiatry (AACAP) considers it necessary that the following be present before attaching the label of ADHD to a child:

www.numerons.in

- The behaviors must appear before age 7.
- They must continue for at least six months.
- The symptoms must also create a real handicap in at least two of the following areas of the child's life:
    - in the classroom,
    - on the playground,
    - at home,
    - in the community, or
    - in social settings.

If a child seems too active on the playground but not elsewhere, the problem might not be ADHD. It might also not be ADHD if the behaviors occur in the classroom but nowhere else. A child who shows some symptoms would not be diagnosed with ADHD if his or her schoolwork or friendships are not impaired by the behaviors.

www.numerons.in

Differential

To make the diagnosis of ADHD, a number of other possible medical and psychological conditions must be excluded.

Medical conditions

Medical conditions that must be excluded include: hypothyroidism, anemia, lead poisoning, chronic illness, hearing or vision impairment, substance abuse, medication side effects, sleep impairment and child abuse, and cluttering (tachyphemia) among others.

Sleep conditions

www.numerons.in

As with other psychological and neurological issues, the relationship between ADHD and sleep is complex. In addition to clinical observations, there is substantial empirical evidence from a neuroanatomic standpoint to suggest that there is considerable overlap in the central nervous system centers that regulate sleep and those that regulate attention/arousal. Primary sleep disorders play a role in the clinical presentation of symptoms of inattention and behavioral dysregulation. There are multilevel and bidirectional relationships among sleep, neurobehavioral functioning and the clinical syndrome of ADHD.

Behavioral manifestations of sleepiness in children range from the classic ones (yawning, rubbing eyes), to externalizing behaviors (impulsivity, hyperactivity, aggressiveness), to mood lability and inattentiveness. Many sleep disorders are important causes of symptoms which may overlap with the cardinal symptoms of ADHD; children with ADHD should be regularly and systematically assessed for sleep problems.

From a clinical standpoint, mechanisms that account for the phenomenon of excessive daytime sleepiness include:

www.numerons.in

- Chronic sleep deprivation, that is insufficient sleep for physiologic sleep needs,
- Fragmented or disrupted sleep, caused by, for example, obstructive sleep apnea (OSA) or periodic limb movement disorder (PLMD),
- Primary clinical disorders of excessive daytime sleepiness, such as narcolepsy and
- Circadian rhythm disorders, such as delayed sleep phase syndrome (DSPS). A study in the Netherlands compared two groups of unmedicated 6-12-year-olds, all of them with "rigorously diagnosed ADHD". 87 of them had problems getting to sleep, 33 had no sleep problems. The larger group had a significantly later dim light melatonin onset (DLMO) than did the children with no sleep problems.

Management

Methods of treatment often involve some combination of behavior modification, life-style changes, counseling, and medication. A 2005 study found that medical management and behavioral treatment is the most effective ADHD management strategy, followed by medication alone, and then behavioral treatment. While medication has been shown to improve behavior when taken over the short term, they have not been shown to alter long term outcomes. Medications have at least some effect in about 80% of people.

www.numerons.in

Psychosocial

The evidence is strong for the effectiveness of behavioral treatments in ADHD. It is recommended first line in those who have mild symptoms and in preschool aged children. Psychological therapies used include psychoeducational input, behavior therapy, cognitive behavioral therapy (CBT), interpersonal psychotherapy (IPT), family therapy, school-based interventions, social skills training and parent management training. Parent training and education have been found to have short term benefits. Family therapy has shown to be of little use in the treatment of ADHD, though it may be worth noting that parents of children with ADHD are more likely to divorce than parents of children without ADHD, particularly when their children are younger than eight years old. Several ADHD specific support groups exist as informational sources and to help families cope with challenges associated with dealing with ADHD.

www.numerons.in

Medication

Ritalin (methylphenidate) 10 mg tablets (AU)

Stimulant medication are the medical treatment of choice. There are a number of non-stimulant medications, such as atomoxetine, that may be used as alternatives. There are no good studies of comparative effectiveness between various medications, and there is a lack of evidence on their effects on academic performance and social behaviors. While stimulants and atomoxetine are generally safe, there are side effects and contraindications to their use. Medications are not recommended for preschool children, as their long-term effects in such young people are unknown. There is very little data on the long-term adverse effects or benefits of stimulants for ADHD. Guidelines on when to use medications vary internationally, with the UK's National Institute of Clinical Excellence, for example, only recommending use in severe cases, while most United States guidelines recommend medications in nearly all cases.

www.numerons.in

Prognosis

Children diagnosed with ADHD have significant difficulties in adolescence, regardless of treatment. In the United States, 37 percent of those with ADHD do not get a high school diploma even though many of them will receive special education services. A 1995 briefing citing a 1994 book review says the combined outcomes of the expulsion and dropout rates indicate that almost half of all ADHD students never finish high school. Also in the US, less than 5 percent of individuals with ADHD get a college degree compared to 28 percent of the general population. Those with ADHD as children are at increased risk of a number of adverse life outcomes once they become teenagers. These include a greater risk of auto crashes, injury and higher medical expenses, earlier sexual activity, and teen pregnancy. Russell Barkley states that adult ADHD impairments affect "education, occupation, social relationships, sexual activities, dating and marriage, parenting and offspring psychological morbidity, crime and drug abuse, health and related lifestyles, financial management, or driving. ADHD can be found to produce diverse and serious impairments". The proportion of children meeting the diagnostic criteria for ADHD drops by about 50 percent over three years after the diagnosis. This occurs regardless of the treatments used and also occurs in untreated children with ADHD. ADHD persists into adulthood in about 30 to 50 percent of cases. Those affected are likely to develop coping mechanisms as they mature, thus compensating for their previous ADHD.

www.numerons.in

Epidemiology

ADHD's global prevalence is estimated at 3 to 5 percent in people under the age of 19. There is, however, both geographical and local variability among studies. Geographically, children in North America appear to have a higher rate of ADHD than children in Africa and the Middle East. Published studies have found rates of ADHD as low as 2 percent and as high as 14 percent among school aged children. The rates of diagnosis and treatment of ADHD are also much higher on the East Coast of the USA than on the West Coast. The frequency of the diagnosis differs between male children (10%) and female children (4%) in the United States. This difference between genders may reflect either a difference in susceptibility or that females with ADHD are less likely to be diagnosed than males.

www.numerons.in

Rates of ADHD diagnosis and treatment have increased in both the UK and the USA since the 1970s. In the UK an estimated 0.5 per 1,000 children had ADHD in the 1970s, while 3 per 1,000 received ADHD medications in the late 1990s. In the USA in the 1970s 12 per 1,000 children had the diagnosis, while in the late 1990s 34 per 1,000 had the diagnosis and the numbers continue to increase.

In the UK in 2003 a prevalence of 3.6 percent is reported in male children and less than 1 percent is reported in female children.

www.numerons.in

History

Hyperactivity has long been part of the human condition. Sir Alexander Crichton describes "mental restlessness" in his book An Inquiry Into the Nature and Origin of Mental

Derangement written in 1798. The terminology used to describe the symptoms of ADHD has gone through many changes over history including: "minimal brain damage", "minimal brain dysfunction" (or disorder), "learning/behavioral disabilities" and "hyperactivity". In the DSM-II (1968) it was the "Hyperkinetic Reaction of Childhood". In the DSM-III "ADD (Attention-Deficit Disorder) with or without hyperactivity" was introduced. In 1987 this was changed to ADHD in the DSM-III-R and subsequent editions. The use of stimulants to treat ADHD was first described in 1937.

www.numerons.in

Society and culture

The media have reported on many issues related to ADHD. In 2001 PBS's Frontline aired a one-hour program about the effects of the diagnosis and treatment of ADHD in minors, entitled "Medicating Kids." The program included a selection of interviews with representatives of various points of view. In one segment, entitled Backlash, retired neurologist Fred Baughman and Peter Breggin whom PBS described as "outspoken critics who insist [ADHD is] a fraud perpetrated by the psychiatric and pharmaceutical industries on families anxious to understand their children's behavior" were interviewed on the legitimacy of the disorder. Russell Barkley and Xavier Castellanos, then head of ADHD research at the National Institute of Mental Health (NIMH), defended the viability of the disorder. In the interview with Castellanos, he stated that little is scientifically understood. Lawrence Diller was interviewed on the business of ADHD along with a representative from Shire Plc.

A number of notable individuals have given controversial opinions on ADHD. Scientologist Tom Cruise's interview with Matt Lauer was widely watched by the public. In this interview he spoke about postpartum depression and also referred to Ritalin and Adderall as being "street drugs" rather than as ADHD medication. In England Baroness Susan Greenfield, a leading neuroscientist, spoke out publicly about the need for a wide-ranging inquiry in the House of Lords into the dramatic increase in the diagnosis of ADHD in the UK and possible causes following a 2007 BBC Panorama programme which highlighted US research (The Multimodal Treatment Study of Children with ADHD by the University of Buffalo showing treatment results of 600) suggesting drugs are no better than other forms of therapy for ADHD in the long term.

Neil Bush (brother of former President George W. Bush) is credited in the cast of a 2005 ADHD documentary called The Drugging of Our Children directed by Gary Null. In the film's trailer Bush says: "Just because it is easy to drug a kid and get them to be compliant doesn't make it right to do it".

As of 2009, eight percent of all Major League Baseball players have been diagnosed with ADHD, making the disorder epidemic among this population. The increase coincided with the League's 2006 ban on stimulants (q.v. Major League Baseball drug policy).

Legal status of medications

Stimulants legal status was recently reviewed by several international organizations:

- Internationally, methylphenidate is a Schedule II drug under the Convention on Psychotropic Substances.
- In the United States, methylphenidate is classified as a Schedule II controlled substance, the designation used for substances that have a recognized medical value but present a high likelihood for abuse because of their addictive potential.
- In the United Kingdom, methylphenidate is a controlled 'Class B' substance, and possession without prescription is illegal, with a sentence up to 14 years and/or an unlimited fine.
- In New Zealand, it is a 'class B2 controlled substance'. Unlawful possession is punishable by 6-month prison sentence and distribution of it is punishable by a 14-year sentence.

www.numerons.in

Controversies

ADHD and its diagnosis and treatment have been considered controversial since the 1970s. The controversies have involved clinicians, teachers, policymakers, parents and the media. Opinions regarding ADHD range from not believing it exists at all to believing there are genetic and physiological bases for the condition as well as disagreement about the use of stimulant medications in treatment. Some sociologists consider ADHD to be a "classic example of the medicalization of deviant behavior, defining a previously nonmedical problem as a medical one". Most healthcare providers in U.S. accept that ADHD is a genuine disorder with debate in centering mainly around how it is diagnosed and treated. However,The British Psychological Society said in a 1997 report that physicians and psychiatrists should not follow the American example of applying medical labels to such a wide variety of attention-related disorders: "The idea that children who don't attend or who don't sit still in school have a mental disorder is not entertained by most British clinicians." In 2009, the British Psychological Society, in collaboration with the Royal College of Psychiatrists, released a set of guidelines for the diagnosis and treatment of ADHD. In its guideline, it state that available evidence indicate that ADHD is a valid diagnosis. However, it states that the diagnosis lack any biological basis and that "[c]ontroversial issues surround changing thresholds applied to the definition of illness as new knowledge and treatments are developed and the extent to which it is acknowledged that clinical thresholds are socially and culturally influenced and determine how an individual's level of functioning within the "normal cultural environment" is assessed. It further states that "the acceptable thresholds for impairment are partly driven by the contemporary societal view of what is an acceptable level of deviation from the norm."

www.numerons.in

Others have included that it may stem from a misunderstanding of the diagnostic criteria and how they are utilized by clinicians,:p.3 teachers, policymakers, parents and the media. Debates center around key controversial issues; whether ADHD is a disability or merely a neurological description, the cause of the disorder, the changing of the diagnostic criteria, the rapid increase in diagnosis of ADHD, and the use of stimulants to treat the disorder. Long term possible side effects of stimulants and their usefulness are largely unknown because of a lack of long term studies. Some research raises questions about the long term effectiveness and side effects of medications used to treat ADHD.

In 1998, the US National Institutes of Health (NIH) released a consensus statement on the diagnosis and treatment of ADHD. The statement, while recognizing that stimulant treatment is controversial, supports the validity of the ADHD diagnosis and the efficacy of stimulant treatment. It found controversy only in the lack of sufficient data on long-term use of medications, and in the need for more research in many areas.

With a "wide variation in diagnosis across states, races, and ethnicities" some investigators suspect that factors other than neurological conditions play a role when the diagnosis of ADHD is made. Two studies published in 2010 suggest that the diagnosis is more likely to be made in the younger children within a grade; the authors propose that such a misdiagnosis of ADHD within a grade may be due to different states of maturity and may lead to potentially inappropriate treatment.

www.numerons.in

In adult

Researchers found that 60 percent of the children diagnosed with ADHD continue having symptoms well into adulthood. Many adults, however, remain untreated. Untreated adults with ADHD often have chaotic lifestyles, may appear to be disorganized and may rely on non-prescribed drugs and alcohol to get by. They often have such associated psychiatric comorbidities as depression, anxiety disorder, bipolar disorder, substance abuse, or a learning disability. A diagnosis of ADHD may offer adults insight into their behaviors and allow patients to become more aware and seek help with coping and treatment strategies. There is controversy amongst some experts on whether ADHD persists into adulthood. Recognized as occurring in adults in 1978, it is currently not addressed separately from ADHD in childhood. Obstacles that clinicians face when assessing adults who may have ADHD include developmentally inappropriate diagnostic criteria, age-related changes, comorbidities and the possibility that high intelligence or situational factors can mask ADHD.

www.numerons.in

Savant syndrome

Savant syndrome, sometimes referred to as savantism, is a rare condition in which people with developmental disorders have one or more areas of expertise, ability, or brilliance that are in contrast with the individual's overall limitations. Although not a recognized medical diagnosis, researcher Darold Treffert says the condition may be either genetic or acquired.

According to Treffert, about half of all people with savant syndrome have autistic disorder, while the other half have another developmental disability, mental retardation, brain injury or disease. He says, "... not all autistic people have savant syndrome and not all people with savant syndrome have autistic disorder". Other researchers state that autistic traits and savant skills may be linked, or have challenged some earlier conclusions about savant syndrome as "hearsay, uncorroborated by independent scrutiny".

www.numerons.in

Though it is even rarer than the savant condition itself, some savants have no apparent abnormalities other than their unique abilities. This does not mean that these abilities weren't triggered by a brain dysfunction of some sort but does temper the theory that all savants are disabled and that some sort of trade-off is required. (see Prodigious Savants below)

Characteristics

www.numerons.in

According to Treffert, something that almost all savants have in common is a prodigious memory of a special type, a memory that he describes as "very deep, but exceedingly narrow". It is wide in the sense that they can recall but have a hard time putting it to use (for more on this see section on savants in Advanced Memory). Also, many savants are found to have superior artistic or musical ability. In layman's terms, a person with Savant syndrome has "islands of genius" within his or her intellectual abilities, where a specific ability or subject is understood to a near perfect level, while other abilities seem to be impaired.

Causes

Savant-like skills may be latent in everyone and have been stimulated in people by directing low-frequency magnetic pulses into the brain's left hemisphere, which is thought to deactivate this dominant region (in at least 90% of right-handed people) and allow the less dominant right hemisphere to take over, allowing for processing of savant-like tasks.

Mechanism

www.numerons.in

Savant syndrome is poorly understood. No widely accepted cognitive theory explains the combination of talent and deficit found in savants. It has been suggested that autistic individuals are biased towards detail-focused processing and that this cognitive style predisposes both autistic and nonautistic individuals to savant talents. Another hypothesis is that hyper-systemizing predisposes people to show talent, where hyper-systemizing is an extreme state in the empathizing–systemizing theory that classifies people based on their skills in empathizing with others versus systemizing facts about the external world, and that the attention to detail shown by many savants is a consequence of enhanced perception or sensory hypersensitivity in autistic individuals. It has also been suggested that savants operate by directly accessing low-level, less-processed information that exists in all human brains but is normally not available to conscious awareness.

Epidemiology

According to Treffert:

www.numerons.in

- One in ten autistic people have savant skills.
- 50% of savants are autistic; the other 50% often have psychological disorders or mental illnesses.
- Prodigious savants have very little disability.

A 2009 British study of 137 parents with autistic children found that 28% believed their offspring met the criteria for a savant skill, that is, a skill or power "at a level that would be unusual even for normal people".

History

According to Treffert, the term idiot savant (French for "learned idiot" or "knowledgeable idiot") was first used to describe the condition in 1887 by John Langdon Down, who is known for his description of Down Syndrome. The term "idiot savant" was later described as a misnomer because not all reported cases fit the definition of idiot, originally used for a person with a very severe mental retardation. The term autistic savant was also used as a diagnosis for this disorder. Like idiot savant, the term autistic savant also became looked at as a misnomer because only one-half of those who were diagnosed at the time with savant syndrome were autistic. Upon realization of the need for accuracy of diagnosis and dignity towards the individual, the term savant syndrome became widely accepted terminology.

Society and culture

Kim Peek was the basis for the 1988 fictional film Rain Man because he was a megasavant.

Savants

A prodigious savant is someone whose skill level would qualify him or her as a prodigy, or exceptional talent, even in the absence of a cognitive disability. Prodigious savants are those individuals whose abilities would be considered phenomenal or genius even in a person without any limitations or special diagnosis of impairment. The most common trait of these prodigious savants is their seemingly limitless mnemonic skills, with many having eidetic or photographic memories. Indeed, prodigious savants are extremely rare, with fewer than one hundred noted in more than a century of literature on the subject. Treffert, the leading researcher in the study of savant syndrome, estimates that fewer than fifty or so such individuals are believed to be alive in the world today. The website of the Wisconsin Medical Society lists 29 savant profiles. Darold Treffert is past-president of the society.

The following are well-known people with savant syndrome, noted for their talent in their identified fields:

- Kim Peek, mnemonist, speed reader and calculator, although not autistic
- Alonzo Clemons, American clay sculptor
- Tony DeBlois, blind American musician
- Leslie Lemke, blind American musician
- Jonathan Lerman, American artist
- Thristan Mendoza, Filipino marimba prodigy
- Gottfried Mind, Swiss artist known as the "Raphael of Cats".
- Derek Paravicini, blind British musician

www.numerons.in

- Gilles Tréhin, artist, author
- James Henry Pullen, gifted British carpenter
- Matt Savage, American autistic jazz prodigy
- Henriett Seth-F., Hungarian autistic savant, poet, writer and artist
- Stephen Wiltshire, British architectural artist
- Richard Wawro, British artist
- George and Charles Finn, calendar calculator twins
- Florence 'Flo' and Katherine 'Kay' Lyman, calendar calculator twins. Featured in a documentary produced by TV network TLC entitled Twin Savants: Flo & Kay
- Temple Grandin, a Doctor of Animal Science at Colorado State University, and consultant to the livestock industry in animal behavior
- Jason D. Padgett, American Mathematical Artist
- Daniel Tammet, British author, public speaker, high-functioning autistic savant, and synesthete

www.numerons.in

Asperger syndrome

Asperger syndrome or Asperger's syndrome or Asperger disorder is an autism spectrum disorder that is characterized by significant difficulties in social interaction, along with restricted and repetitive patterns of behavior and interests. It differs from other autism spectrum disorders by its relative preservation of linguistic and cognitive development. Although not required for diagnosis, physical clumsiness and atypical use of language are frequently reported.

www.numerons.in

People with Asperger's often display intense interests, such as this boy's fascination with molecular structure.

Asperger syndrome is named after the Austrian pediatrician Hans Asperger who, in 1944, studied and described children in his practice who lacked nonverbal communication skills, demonstrated limited empathy with their peers, and were physically clumsy. Fifty years later, it was standardized as a diagnosis, but many questions remain about aspects of the disorder. For example, there is doubt about whether it is distinct from high-functioning autism (HFA); partly because of this, its prevalence is not firmly established. It has been proposed that the diagnosis of Asperger's be eliminated, to be replaced by a diagnosis of autism spectrum disorder on a severity scale.

www.numerons.in

The exact cause is unknown, although research supports the likelihood of a genetic basis; brain imaging techniques have not identified a clear common pathology. There is no single treatment, and the effectiveness of particular interventions is supported by only limited data. Intervention is aimed at improving symptoms and function. The mainstay of management is behavioral therapy, focusing on specific deficits to address poor communication skills, obsessive or repetitive routines, and physical clumsiness. Most children improve as they mature to adulthood, but social and communication difficulties may persist. Some researchers and people with Asperger's have advocated a shift in attitudes toward the view that it is a difference, rather than a disability that must be treated or cured.

Classification

Asperger syndrome (AS) is one of the autism spectrum disorders (ASD) or pervasive developmental disorders (PDD), which are a spectrum of psychological conditions that are characterized by abnormalities of social interaction and communication that pervade the individual's functioning, and by restricted and repetitive interests and behavior. Like other psychological development disorders, ASD begins in infancy or childhood, has a steady course without remission or relapse, and has impairments that result from maturation-related changes in various systems of the brain. ASD, in turn, is a subset of the broader autism phenotype (BAP), which describes individuals who may not have ASD but do have autistic-like traits, such as social deficits. Of the other four ASD forms, autism is the most similar to AS in signs and likely causes but its diagnosis requires impaired communication and allows delay in cognitive development; Rett syndrome and childhood disintegrative disorder share several signs with autism but may have unrelated causes; and pervasive developmental disorder not otherwise specified (PDD-NOS) is diagnosed when the criteria for a more specific disorder are unmet.

www.numerons.in

The extent of the overlap between AS and high-functioning autism (HFA—autism unaccompanied by mental retardation) is unclear. The current ASD classification is to some extent an artifact of how autism was discovered, and may not reflect the true nature of the spectrum. One of the proposed changes in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition, set to be published in May 2013, would eliminate Asperger syndrome as a separate diagnosis, and fold it under autistic disorder (autism spectrum disorder), which would be rated on a severity scale. The proposed change is controversial, and it has been argued that the syndrome's diagnostic criteria should be changed instead.

www.numerons.in

Asperger syndrome is also called Asperger's syndrome (AS), Asperger (or Asperger's) disorder (AD), or just Asperger's. There is little consensus among clinical researchers about whether the condition's name should end in "syndrome" or "disorder".

Characteristics

A pervasive developmental disorder, Asperger syndrome is distinguished by a pattern of symptoms rather than a single symptom. It is characterized by qualitative impairment in social interaction, by stereotyped and restricted patterns of behavior, activities and interests, and by no clinically significant delay in cognitive development or general delay in language. Intense preoccupation with a narrow subject, one-sided verbosity, restricted prosody, and physical clumsiness are typical of the condition, but are not required for diagnosis.

Social interaction

The lack of demonstrated empathy is possibly the most dysfunctional aspect of Asperger syndrome. Individuals with AS experience difficulties in basic elements of social interaction, which may include a failure to develop friendships or to seek shared enjoyments or achievements with others (for example, showing others objects of interest), a lack of social or emotional reciprocity, and impaired nonverbal behaviors in areas such as eye contact, facial expression, posture, and gesture.

Unlike those with autism, people with AS are not usually withdrawn around others; they approach others, even if awkwardly. For example, a person with AS may engage in a one-sided, long-winded speech about a favorite topic, while misunderstanding or not recognizing the listener's feelings or reactions, such as a need for privacy or haste to leave. This social awkwardness has been called "active but odd". This failure to react appropriately to social interaction may appear as disregard for other people's feelings, and may come across as insensitive. However, not all individuals with AS will approach others. Some of them may even display selective mutism, speaking not at all to most people and excessively to specific people. Some may choose to talk only to people they like.

The cognitive ability of children with AS often allows them to articulate social norms in a laboratory context, where they may be able to show a theoretical understanding of other people's emotions; however, they typically have difficulty acting on this knowledge in fluid, real-life situations. People with AS may analyze and distill their observations of social interaction into rigid behavioral guidelines, and apply these rules in awkward ways, such as forced eye contact, resulting in a demeanor that appears rigid or socially naive. Childhood desire for companionship can become numbed through a history of failed social encounters.

www.numerons.in

The hypothesis that individuals with AS are predisposed to violent or criminal behavior has been investigated but is not supported by data. More evidence suggests children with AS are victims rather than victimizers. A 2008 review found that an overwhelming number of

reported violent criminals with AS had coexisting psychiatric disorders such as schizoaffective disorder.

Restricted and repetitive interests and behavior

People with Asperger syndrome often display behavior, interests, and activities that are restricted and repetitive and are sometimes abnormally intense or focused. They may stick to inflexible routines, move in stereotyped and repetitive ways, or preoccupy themselves with parts of objects.

www.numerons.in

Pursuit of specific and narrow areas of interest is one of the most striking features of AS. Individuals with AS may collect volumes of detailed information on a relatively narrow topic such as weather data or star names, without necessarily having genuine understanding of the broader topic. For example, a child might memorize camera model numbers while caring little about photography. This behavior is usually apparent by grade school, typically age 5 or 6 in the United States. Although these special interests may change from time to time, they typically become more unusual and narrowly focused, and often dominate social interaction so much that the entire family may become immersed. Because narrow topics often capture the interest of children, this symptom may go unrecognized.

Stereotyped and repetitive motor behaviors are a core part of the diagnosis of AS and other ASDs. They include hand movements such as flapping or twisting, and complex whole-body movements. These are typically repeated in longer bursts and look more voluntary or ritualistic than tics, which are usually faster, less rhythmical and less often symmetrical.

www.numerons.in

Speech and language

Although individuals with Asperger syndrome acquire language skills without significant general delay and their speech typically lacks significant abnormalities, language acquisition and use is often atypical. Abnormalities include verbosity, abrupt transitions, literal interpretations and miscomprehension of nuance, use of metaphor meaningful only to the speaker, auditory perception deficits, unusually pedantic, formal or idiosyncratic speech, and oddities in loudness, pitch, intonation, prosody, and rhythm.

Three aspects of communication patterns are of clinical interest: poor prosody, tangential and circumstantial speech, and marked verbosity. Although inflection and intonation may be less rigid or monotonic than in autism, people with AS often have a limited range of intonation: speech may be unusually fast, jerky or loud. Speech may convey a sense of incoherence; the conversational style often includes monologues about topics that bore the listener, fails to provide context for comments, or fails to suppress internal thoughts. Individuals with AS may fail to monitor whether the listener is interested or engaged in the conversation. The speaker's conclusion or point may never be made, and attempts by the listener to elaborate on the speech's content or logic, or to shift to related topics, are often unsuccessful.

www.numerons.in

Children with AS may have an unusually sophisticated vocabulary at a young age and have been colloquially called "little professors", but have difficulty understanding figurative language and tend to use language literally. Children with AS appear to have particular weaknesses in areas of nonliteral language that include humor, irony, and teasing. Although individuals with AS usually understand the cognitive basis of humor, they seem to lack understanding of the intent of humor to share enjoyment with others. Despite strong evidence of impaired humor appreciation, anecdotal reports of humor in individuals with AS seem to challenge some psychological theories of AS and autism. According to the Adult Asperger Assessment (AAA) diagnostic test, a lack of interest in fiction and the positive preference towards non-fiction is common among adults with the disorder, which might explain the lack of understanding of verbal symbolisms and nonliteral language for people with Asperger's.

www.numerons.in

Other

Individuals with Asperger syndrome may have signs or symptoms that are independent of the diagnosis, but can affect the individual or the family. These include differences in perception and problems with motor skills, sleep, and emotions.

Individuals with AS often have excellent auditory and visual perception. Children with ASD often demonstrate enhanced perception of small changes in patterns such as arrangements of objects or well-known images; typically this is domain-specific and involves processing of fine-grained features. Conversely, compared to individuals with high-functioning autism, individuals with AS have deficits in some tasks involving visual-spatial perception, auditory perception, or visual memory. Many accounts of individuals with AS and ASD report other unusual sensory and perceptual skills and experiences. They may be unusually sensitive or insensitive to sound, light, and other stimuli; these sensory responses are found in other developmental disorders and are not specific to AS or to ASD. There is little support for increased fight-or-flight response or failure of habituation in autism; there is more evidence of decreased responsiveness to sensory stimuli, although several studies show no differences.

www.numerons.in

Hans Asperger's initial accounts and other diagnostic schemes include descriptions of physical clumsiness. Children with AS may be delayed in acquiring skills requiring motor dexterity, such as riding a bicycle or opening a jar, and may seem to move awkwardly or feel "uncomfortable in their own skin". They may be poorly coordinated, or have an odd or bouncy gait or posture, poor handwriting, or problems with visual-motor integration. They may show problems with proprioception (sensation of body position) on measures of apraxia (motor planning disorder), balance, tandem gait, and finger-thumb apposition. There is no evidence that these motor skills problems differentiate AS from other high-functioning ASDs.

www.numerons.in

Children with AS are more likely to have sleep problems, including difficulty in falling asleep, frequent nocturnal awakenings, and early morning awakenings. AS is also associated with high levels of alexithymia, which is difficulty in identifying and describing

one's emotions. Although AS, lower sleep quality, and alexithymia are associated, their causal relationship is unclear.

As with other forms of ASD, parents of children with AS have higher levels of stress.

Causes

Hans Asperger described common symptoms among his patients' family members, especially fathers, and research supports this observation and suggests a genetic contribution to Asperger syndrome. Although no specific gene has yet been identified, multiple factors are believed to play a role in the expression of autism, given the phenotypic variability seen in children with AS. Evidence for a genetic link is the tendency for AS to run in families and an observed higher incidence of family members who have behavioral symptoms similar to AS but in a more limited form (for example, slight difficulties with social interaction, language, or reading). Most research suggests that all autism spectrum disorders have shared genetic mechanisms, but AS may have a stronger genetic component than autism. There is probably a common group of genes where particular alleles render an individual vulnerable to developing AS; if this is the case, the particular combination of alleles would determine the severity and symptoms for each individual with AS.

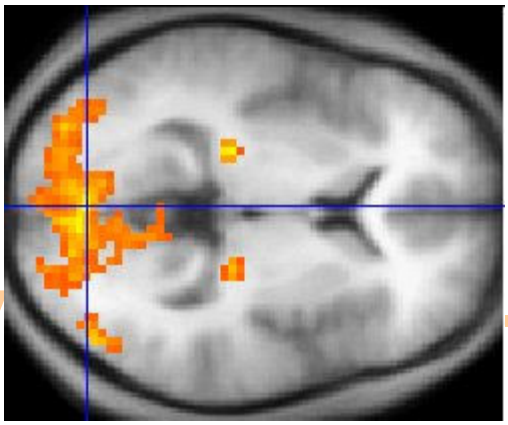
A few ASD cases have been linked to exposure to teratogens (agents that cause birth defects) during the first eight weeks from conception. Although this does not exclude the possibility that ASD can be initiated or affected later, it is strong evidence that it arises very early in development. Many environmental factors have been hypothesized to act after birth, but none has been confirmed by scientific investigation.

Mechanism

Asperger syndrome appears to result from developmental factors that affect many or all functional brain systems, as opposed to localized effects. Although the specific underpinnings of AS or factors that distinguish it from other ASDs are unknown, and no clear pathology common to individuals with AS has emerged, it is still possible that AS's mechanism is separate from other ASD. Neuroanatomical studies and the associations with teratogens strongly suggest that the mechanism includes alteration of brain development soon after conception. Abnormal migration of embryonic cells during fetal development may affect the final structure and connectivity of the brain, resulting in alterations in the neural circuits that control thought and behavior. Several theories of mechanism are available; none are likely to provide a complete explanation.

Monochrome fMRI image of a horizontal cross-section of a human brain. A few regions, mostly to the rear, are highlighted in orange and yellow.

www.numerons.in



Functional magnetic resonance imaging provides some evidence for both underconnectivity and mirror neuron theories.

The underconnectivity theory hypothesizes underfunctioning high-level neural connections and synchronization, along with an excess of low-level processes. It maps well to general-processing theories such as weak central coherence theory, which hypothesizes that a limited ability to see the big picture underlies the central disturbance in ASD. A related theory—enhanced perceptual functioning—focuses more on the superiority of locally oriented and perceptual operations in autistic individuals.

The mirror neuron system (MNS) theory hypothesizes that alterations to the development of the MNS interfere with imitation and lead to Asperger's core feature of social impairment. For example, one study found that activation is delayed in the core circuit for imitation in individuals with AS. This theory maps well to social cognition theories like the theory of mind, which hypothesizes that autistic behavior arises from impairments in ascribing mental states to oneself and others, or hyper-systemizing, which hypothesizes that autistic individuals can systematize internal operation to handle internal events but are less effective at empathizing by handling events generated by other agents.

Other possible mechanisms include serotonin dysfunction and cerebellar dysfunction.

Screening

Parents of children with Asperger syndrome can typically trace differences in their children's development to as early as 30 months of age. Developmental screening during a routine check-up by a general practitioner or pediatrician may identify signs that warrant further investigation. The diagnosis of AS is complicated by the use of several different screening instruments, including the Asperger Syndrome Diagnostic Scale (ASDS), Autism Spectrum Screening Questionnaire (ASSQ), Childhood Asperger Syndrome Test (CAST), Gilliam Asperger's Disorder Scale (GADS), Krug Asperger's Disorder Index (KADI), and the Autism Spectrum Quotient (AQ; with versions for children, adolescents and adults). None have been shown to reliably differentiate between AS and other ASDs.

Diagnosis

Standard diagnostic criteria require impairment in social interaction and repetitive and stereotyped patterns of behavior, activities and interests, without significant delay in language or cognitive development. Unlike the international standard, U.S. criteria also require significant impairment in day-to-day functioning. Other sets of diagnostic criteria have been proposed by Szatmari et al. and by Gillberg and Gillberg.

www.numerons.in

Diagnosis is most commonly made between the ages of four and eleven. A comprehensive assessment involves a multidisciplinary team that observes across multiple settings, and includes neurological and genetic assessment as well as tests for cognition, psychomotor function, verbal and nonverbal strengths and weaknesses, style of learning, and skills for independent living. The "gold standard" in diagnosing ASDs combines clinical judgment with the Autism Diagnostic Interview-Revised (ADI-R)—a semistructured parent interview—and the Autism Diagnostic Observation Schedule (ADOS)—a conversation and play-based interview with the child. Delayed or mistaken diagnosis can be traumatic for individuals and families; for example, misdiagnosis can lead to medications that worsen behavior. Many children with AS are initially misdiagnosed with attention-deficit hyperactivity disorder (ADHD). Diagnosing adults is more challenging, as standard diagnostic criteria are designed for children and the expression of AS changes with age; adult diagnosis requires painstaking clinical examination and thorough medical history gained from both the individual and other people who know the person, focusing on childhood behavior. Conditions that must be considered in a differential diagnosis include other ASDs, the schizophrenia spectrum, ADHD, obsessive compulsive disorder, major depressive disorder, semantic pragmatic disorder, nonverbal learning disorder, Tourette syndrome, stereotypic movement disorder and bipolar disorder.

www.numerons.in

Underdiagnosis and overdiagnosis are problems in marginal cases. The cost and difficulty of screening and assessment can delay diagnosis. Conversely, the increasing popularity of drug treatment options and the expansion of benefits has motivated providers to overdiagnose ASD. There are indications AS has been diagnosed more frequently in recent years, partly as a residual diagnosis for children of normal intelligence who do not have autism but have social difficulties. In 2006, it was reported to be the fastest-growing psychiatric diagnosis in Silicon Valley children; also, there is a predilection for adults to self-diagnose it. There are questions about the external validity of the AS diagnosis. That is, it is unclear whether there is a practical benefit in distinguishing AS from HFA and from PDD-NOS; the same child can receive different diagnoses depending on the screening tool. The debate about distinguishing AS from HFA is partly due to a tautological dilemma where disorders are defined based on severity of impairment, so that studies that appear to confirm differences based on severity are to be expected.

www.numerons.in

Management

Asperger syndrome treatment attempts to manage distressing symptoms and to teach age-appropriate social, communication and vocational skills that are not naturally acquired during development, with intervention tailored to the needs of the individual based on

multidisciplinary assessment. Although progress has been made, data supporting the efficacy of particular interventions are limited.

Therapies

The ideal treatment for AS coordinates therapies that address core symptoms of the disorder, including poor communication skills and obsessive or repetitive routines. While most professionals agree that the earlier the intervention, the better, there is no single best treatment package. AS treatment resembles that of other high-functioning ASDs, except that it takes into account the linguistic capabilities, verbal strengths, and nonverbal vulnerabilities of individuals with AS. A typical program generally includes:

www.numerons.in

- The training of social skills for more effective interpersonal interactions,
- Cognitive behavioral therapy to improve stress management relating to anxiety or explosive emotions, and to cut back on obsessive interests and repetitive routines,
- Medication, for coexisting conditions such as major depressive disorder and anxiety disorder,
- Occupational or physical therapy to assist with poor sensory integration and motor coordination,
- Social communication intervention, which is specialized speech therapy to help with the pragmatics of the give and take of normal conversation,
- The training and support of parents, particularly in behavioral techniques to use in the home.

www.numerons.in

Of the many studies on behavior-based early intervention programs, most are case studies of up to five participants, and typically examine a few problem behaviors such as self-injury, aggression, noncompliance, stereotypies, or spontaneous language; unintended side effects are largely ignored. Despite the popularity of social skills training, its effectiveness is not firmly established. A randomized controlled study of a model for training parents in problem behaviors in their children with AS showed that parents attending a one-day workshop or six individual lessons reported fewer behavioral problems, while parents receiving the individual lessons reported less intense behavioral problems in their AS children. Vocational training is important to teach job interview etiquette and workplace behavior to older children and adults with AS, and organization software and personal data assistants can improve the work and life management of people with AS.

Medications

No medications directly treat the core symptoms of AS. Although research into the efficacy of pharmaceutical intervention for AS is limited, it is essential to diagnose and treat comorbid conditions. Deficits in self-identifying emotions or in observing effects of one's behavior on others can make it difficult for individuals with AS to see why medication may be appropriate. Medication can be effective in combination with behavioral interventions and environmental accommodations in treating comorbid symptoms such as anxiety disorder, major depressive disorder, inattention and aggression. The atypical antipsychotic medications risperidone and olanzapine have been shown to reduce the associated

www.numerons.in

symptoms of AS; risperidone can reduce repetitive and self-injurious behaviors, aggressive outbursts and impulsivity, and improve stereotypical patterns of behavior and social relatedness. The selective serotonin reuptake inhibitors (SSRIs) fluoxetine, fluvoxamine and sertraline have been effective in treating restricted and repetitive interests and behaviors.

Care must be taken with medications, as side effects may be more common and harder to evaluate in individuals with AS, and tests of drugs' effectiveness against comorbid conditions routinely exclude individuals from the autism spectrum. Abnormalities in metabolism, cardiac conduction times, and an increased risk of type 2 diabetes have been raised as concerns with these medications, along with serious long-term neurological side effects. SSRIs can lead to manifestations of behavioral activation such as increased impulsivity, aggression and sleep disturbance. Weight gain and fatigue are commonly reported side effects of risperidone, which may also lead to increased risk for extrapyramidal symptoms such as restlessness and dystonia and increased serum prolactin levels. Sedation and weight gain are more common with olanzapine, which has also been linked with diabetes. Sedative side-effects in school-age children have ramifications for classroom learning. Individuals with AS may be unable to identify and communicate their internal moods and emotions or to tolerate side effects that for most people would not be problematic.

www.numerons.in

Prognosis

There is some evidence that children with AS may see a lessening of symptoms; up to 20% of children may no longer meet the diagnostic criteria as adults, although social and communication difficulties may persist. As of 2006, no studies addressing the long-term outcome of individuals with Asperger syndrome are available and there are no systematic long-term follow-up studies of children with AS. Individuals with AS appear to have normal life expectancy, but have an increased prevalence of comorbid psychiatric conditions, such as major depressive disorder and anxiety disorder that may significantly affect prognosis. Although social impairment is lifelong, the outcome is generally more positive than with individuals with lower functioning autism spectrum disorders; for example, ASD symptoms are more likely to diminish with time in children with AS or HFA. Although most students with AS/HFA have average mathematical ability and test slightly worse in mathematics than in general intelligence, some are gifted in mathematics and AS has not prevented some adults from major accomplishments such as winning the Nobel Prize.

www.numerons.in

Children with AS may require special education services because of their social and behavioral difficulties although many attend regular education classes. Adolescents with AS may exhibit ongoing difficulty with self care, organization and disturbances in social and romantic relationships; despite high cognitive potential, most young adults with AS remain at home, although some do marry and work independently. The "different-ness" adolescents experience can be traumatic. Anxiety may stem from preoccupation over possible violations of routines and rituals, from being placed in a situation without a clear schedule or expectations, or from concern with failing in social encounters; the resulting stress may manifest as inattention, withdrawal, reliance on obsessions, hyperactivity, or

aggressive or oppositional behavior. Depression is often the result of chronic frustration from repeated failure to engage others socially, and mood disorders requiring treatment may develop. Clinical experience suggests the rate of suicide may be higher among those with AS, but this has not been confirmed by systematic empirical studies.

Education of families is critical in developing strategies for understanding strengths and weaknesses; helping the family to cope improves outcomes in children. Prognosis may be improved by diagnosis at a younger age that allows for early interventions, while interventions in adulthood are valuable but less beneficial. There are legal implications for individuals with AS as they run the risk of exploitation by others and may be unable to comprehend the societal implications of their actions.

www.numerons.in

Epidemiology

Prevalence estimates vary enormously. A 2003 review of epidemiological studies of children found autism prevalence rates ranging from 0.03 to 4.84 per 1,000, with the ratio of autism to Asperger syndrome ranging from 1.5:1 to 16:1; combining the geometric mean ratio of 5:1 with a conservative prevalence estimate for autism of 1.3 per 1,000 suggests indirectly that the prevalence of AS might be around 0.26 per 1,000. Part of the variance in estimates arises from differences in diagnostic criteria. For example, a relatively small 2007 study of 5,484 eight-year-old children in Finland found 2.9 children per 1,000 met the ICD-10 criteria for an AS diagnosis, 2.7 per 1,000 for Gillberg and Gillberg criteria, 2.5 for DSM-IV, 1.6 for Szatmari et al., and 4.3 per 1,000 for the union of the four criteria. Boys seem to be more likely to have AS than girls; estimates of the sex ratio range from 1.6:1 to 4:1, using the Gillberg and Gillberg criteria.

www.numerons.in

Anxiety disorder and major depressive disorder are the most common conditions seen at the same time; comorbidity of these in persons with AS is estimated at 65%. Depression is common in adolescents and adults; children are likely to present with ADHD. Reports have associated AS with medical conditions such as aminoaciduria and ligamentous laxity, but these have been case reports or small studies and no factors have been associated with AS across studies. One study of males with AS found an increased rate of epilepsy and a high rate (51%) of nonverbal learning disorder. AS is associated with tics, Tourette syndrome, and bipolar disorder, and the repetitive behaviors of AS have many similarities with the symptoms of obsessive-compulsive disorder and obsessive-compulsive personality disorder. However many of these studies are based on clinical samples or lack standardized measures; nonetheless, comorbid conditions are relatively common.

History

www.numerons.in

Named after the Austrian pediatrician Hans Asperger (1906–1980), Asperger syndrome is a relatively new diagnosis in the field of autism. As a child, Asperger appears to have exhibited some features of the very condition named after him, such as remoteness and talent in language. In 1944, Asperger described four children in his practice who had difficulty in integrating themselves socially. The children lacked nonverbal communication skills, failed to demonstrate empathy with their peers, and were physically clumsy.

Asperger called the condition "autistic psychopathy" and described it as primarily marked by social isolation. Unlike today's AS, autistic psychopathy could be found in people of all levels of intelligence, including those with mental retardation. In the context of the Nazi eugenics policy of sterilizing and killing social deviants and the mentally handicapped, Asperger passionately defended the value of autistic individuals, writing "We are convinced, then, that autistic people have their place in the organism of the social community. They fulfil their role well, perhaps better than anyone else could, and we are talking of people who as children had the greatest difficulties and caused untold worries to their care-givers." Asperger also called his young patients "little professors", and believed some would be capable of exceptional achievement and original thought later in life. His paper was published during wartime and in German, so it was not widely read elsewhere.

www.numerons.in

Lorna Wing popularized the term Asperger syndrome in the English-speaking medical community in her 1981 publication of a series of case studies of children showing similar symptoms, and Uta Frith translated Asperger's paper to English in 1991. Sets of diagnostic criteria were outlined by Gillberg and Gillberg in 1989 and by Szatmari et al. in the same year. AS became a standard diagnosis in 1992, when it was included in the tenth edition of the World Health Organization's diagnostic manual, International Classification of Diseases (ICD-10); in 1994, it was added to the fourth edition of the American Psychiatric Association's diagnostic reference, Diagnostic and Statistical Manual of Mental Disorders (DSM-IV).

Hundreds of books, articles and websites now describe AS, and prevalence estimates have increased dramatically for ASD, with AS recognized as an important subgroup. Whether it should be seen as distinct from high-functioning autism is a fundamental issue requiring further study, and there are questions about the empirical validation of the DSM-IV and ICD-10 criteria.

www.numerons.in

Cultural aspects

People identifying with Asperger syndrome may refer to themselves in casual conversation as aspies, coined by Liane Holliday Willey in 1999. The word neurotypical (abbreviated NT) describes a person whose neurological development and state are typical, and is often used to refer to non-autistic people. The Internet has allowed individuals with AS to communicate and celebrate diversity with each other in a way that was not previously possible because of their rarity and geographic dispersal. A subculture of aspies has formed. Internet sites like Wrong Planet have made it easier for individuals to connect.

Autistic people have advocated a shift in perception of autism spectrum disorders as complex syndromes rather than diseases that must be cured. Proponents of this view reject the notion that there is an "ideal" brain configuration and that any deviation from the norm is pathological; they promote tolerance for what they call neurodiversity. These views are the basis for the autistic rights and autistic pride movements. There is a contrast between the attitude of adults with self-identified AS, who typically do not want to be cured and are proud of their identity, and parents of children with AS, who typically seek assistance and a cure for their children.

www.numerons.in

Some researchers have argued that AS can be viewed as a different cognitive style, not a disorder or a disability, and that it should be removed from the standard Diagnostic and Statistical Manual, much as homosexuality was removed. In a 2002 paper, Simon Baron-Cohen wrote of those with AS, "In the social world there is no great benefit to a precise eye for detail, but in the worlds of maths, computing, cataloguing, music, linguistics, engineering, and science, such an eye for detail can lead to success rather than failure." Baron-Cohen cited two reasons why it might still be useful to consider AS to be a disability: to ensure provision for legally required special support, and to recognize emotional difficulties from reduced empathy. It has been argued that the genes for Asperger's combination of abilities have operated throughout recent human evolution and have made remarkable contributions to human history.

www.numerons.in

Autism

Autism is a disorder of neural development characterized by impaired social interaction and communication, and by restricted and repetitive behavior. These signs all begin before a child is three years old. Autism affects information processing in the brain by altering how nerve cells and their synapses connect and organize; how this occurs is not well understood. It is one of three recognized disorders in the autism spectrum (ASDs), the other two being Asperger syndrome, which lacks delays in cognitive development and language, and Pervasive Developmental Disorder-Not Otherwise Specified (commonly abbreviated as PDD-NOS), which is diagnosed when the full set of criteria for autism or Asperger syndrome are not met.

www.numerons.in

Repetitively stacking or lining up objects is a behavior occasionally associated with individuals with autism.

Autism has a strong genetic basis, although the genetics of autism are complex and it is unclear whether ASD is explained more by rare mutations, or by rare combinations of common genetic variants. In rare cases, autism is strongly associated with agents that cause birth defects. Controversies surround other proposed environmental causes, such as heavy metals, pesticides or childhood vaccines; the vaccine hypotheses are biologically implausible and lack convincing scientific evidence. The prevalence of autism is about 1–2 per 1,000 people worldwide; however, the Centers for Disease Control and Prevention (CDC) reports approximately 9 per 1,000 children in the United States are diagnosed with ASD. The number of people diagnosed with autism has increased dramatically since the 1980s, partly due to changes in diagnostic practice; the question of whether actual prevalence has increased is unresolved.

Parents usually notice signs in the first two years of their child's life. The signs usually develop gradually, but some autistic children first develop more normally and then regress. Early behavioral or cognitive intervention can help autistic children gain self-care, social, and communication skills. Although there is no known cure, there have been reported cases of children who recovered. Not many children with autism live independently after reaching adulthood, though some become successful. An autistic culture has developed, with some individuals seeking a cure and others believing autism should be accepted as a difference and not treated as a disorder.

Characteristics

Autism is a highly variable neurodevelopmental disorder that first appears during infancy or childhood, and generally follows a steady course without remission. Overt symptoms gradually begin after the age of six months, become established by age two or three years, and tend to continue through adulthood, although often in more muted form. It is distinguished not by a single symptom, but by a characteristic triad of symptoms: impairments in social interaction; impairments in communication; and restricted interests and repetitive behavior. Other aspects, such as atypical eating, are also common but are not essential for diagnosis. Autism's individual symptoms occur in the general population and appear not to associate highly, without a sharp line separating pathologically severe from common traits.

Social development

Social deficits distinguish autism and the related autism spectrum disorders (ASD; see Classification) from other developmental disorders. People with autism have social impairments and often lack the intuition about others that many people take for granted. Noted autistic Temple Grandin described her inability to understand the social communication of neurotypicals, or people with normal neural development, as leaving her feeling "like an anthropologist on Mars".

Unusual social development becomes apparent early in childhood. Autistic infants show less attention to social stimuli, smile and look at others less often, and respond less to their

own name. Autistic toddlers differ more strikingly from social norms; for example, they have less eye contact and turn taking, and do not have the ability to use simple movements to express themselves, such as the deficiency to point at things. Three- to five-year-old autistic children are less likely to exhibit social understanding, approach others spontaneously, imitate and respond to emotions, communicate nonverbally, and take turns with others. However, they do form attachments to their primary caregivers. Most autistic children display moderately less attachment security than non-autistic children, although this difference disappears in children with higher mental development or less severe ASD. Older children and adults with ASD perform worse on tests of face and emotion recognition.

www.numerons.in

Children with high-functioning autism suffer from more intense and frequent loneliness compared to non-autistic peers, despite the common belief that children with autism prefer to be alone. Making and maintaining friendships often proves to be difficult for those with autism. For them, the quality of friendships, not the number of friends, predicts how lonely they feel. Functional friendships, such as those resulting in invitations to parties, may affect the quality of life more deeply.

There are many anecdotal reports, but few systematic studies, of aggression and violence in individuals with ASD. The limited data suggest that, in children with mental retardation, autism is associated with aggression, destruction of property, and tantrums. A 2007 study interviewed parents of 67 children with ASD and reported that about two-thirds of the children had periods of severe tantrums and about one-third had a history of aggression, with tantrums significantly more common than in non-autistic children with language impairments. A 2008 Swedish study found that, of individuals aged 15 or older discharged from hospital with a diagnosis of ASD, those who committed violent crimes were significantly more likely to have other psychopathological conditions such as psychosis.

www.numerons.in

Communication

About a third to a half of individuals with autism do not develop enough natural speech to meet their daily communication needs. Differences in communication may be present from the first year of life, and may include delayed onset of babbling, unusual gestures, diminished responsiveness, and vocal patterns that are not synchronized with the caregiver. In the second and third years, autistic children have less frequent and less diverse babbling, consonants, words, and word combinations; their gestures are less often integrated with words. Autistic children are less likely to make requests or share experiences, and are more likely to simply repeat others' words (echolalia) or reverse pronouns. Joint attention seems to be necessary for functional speech, and deficits in joint attention seem to distinguish infants with ASD: for example, they may look at a pointing hand instead of the pointed-at object, and they consistently fail to point at objects in order to comment on or share an experience. Autistic children may have difficulty with imaginative play and with developing symbols into language.

www.numerons.in

In a pair of studies, high-functioning autistic children aged 8–15 performed equally well as, and adults better than, individually matched controls at basic language tasks involving vocabulary and spelling. Both autistic groups performed worse than controls at complex

language tasks such as figurative language, comprehension and inference. As people are often sized up initially from their basic language skills, these studies suggest that people speaking to autistic individuals are more likely to overestimate what their audience comprehends.

Repetitive behavior

Autistic individuals display many forms of repetitive or restricted behavior, which the Repetitive Behavior Scale-Revised (RBS-R) categorizes as follows.

www.numerons.in

Young boy asleep on a bed, facing the camera, with only the head visible and the body off-camera. On the bed behind the boy's head is a dozen or so toys carefully arranged in a line, ordered by size.

A young boy with autism, and the precise line of toys he made

- Stereotypy is repetitive movement, such as hand flapping, making sounds, head rolling, or body rocking.
- Compulsive behavior is intended and appears to follow rules, such as arranging objects in stacks or lines.
- Sameness is resistance to change; for example, insisting that the furniture not be moved or refusing to be interrupted.
- Ritualistic behavior involves an unvarying pattern of daily activities, such as an unchanging menu or a dressing ritual. This is closely associated with sameness and an independent validation has suggested combining the two factors.
- Restricted behavior is limited in focus, interest, or activity, such as preoccupation with a single television program, toy, or game.

www.numerons.in

- Self-injury includes movements that injure or can injure the person, such as eye poking, skin picking, hand biting, and head banging. A 2007 study reported that self-injury at some point affected about 30% of children with ASD.

No single repetitive or self-injurious behavior seems to be specific to autism, but only autism appears to have an elevated pattern of occurrence and severity of these behaviors.
Other symptoms

www.numerons.in

Autistic individuals may have symptoms that are independent of the diagnosis, but that can affect the individual or the family. An estimated 0.5% to 10% of individuals with ASD show unusual abilities, ranging from splinter skills such as the memorization of trivia to the extraordinarily rare talents of prodigious autistic savants. Many individuals with ASD show superior skills in perception and attention, relative to the general population. Sensory abnormalities are found in over 90% of those with autism, and are considered core features by some, although there is no good evidence that sensory symptoms differentiate autism from other developmental disorders. Differences are greater for under-responsivity (for example, walking into things) than for over-responsivity (for example, distress from loud noises) or for sensation seeking (for example, rhythmic movements). An estimated 60%–80% of autistic people have motor signs that include poor muscle tone, poor motor planning, and toe walking; deficits in motor coordination are pervasive across ASD and are greater in autism proper.

Unusual eating behavior occurs in about three-quarters of children with ASD, to the extent that it was formerly a diagnostic indicator. Selectivity is the most common problem, although eating rituals and food refusal also occur; this does not appear to result in malnutrition. Although some children with autism also have gastrointestinal (GI) symptoms, there is a lack of published rigorous data to support the theory that autistic children have more or different GI symptoms than usual; studies report conflicting results, and the relationship between GI problems and ASD is unclear.

www.numerons.in

Parents of children with ASD have higher levels of stress. Siblings of children with ASD report greater admiration of and less conflict with the affected sibling than siblings of unaffected children or those with Down syndrome; siblings of individuals with ASD have greater risk of negative well-being and poorer sibling relationships as adults.

Classification

Autism is one of the five pervasive developmental disorders (PDD), which are characterized by widespread abnormalities of social interactions and communication, and severely restricted interests and highly repetitive behavior. These symptoms do not imply sickness, fragility, or emotional disturbance.

www.numerons.in

Of the five PDD forms, Asperger syndrome is closest to autism in signs and likely causes; Rett syndrome and childhood disintegrative disorder share several signs with autism, but may have unrelated causes; PDD not otherwise specified (PDD-NOS; also called atypical autism) is diagnosed when the criteria are not met for a more specific disorder. Unlike with

autism, people with Asperger syndrome have no substantial delay in language development. The terminology of autism can be bewildering, with autism, Asperger syndrome and PDD-NOS often called the autism spectrum disorders (ASD) or sometimes the autistic disorders, whereas autism itself is often called autistic disorder, childhood autism, or infantile autism. In this article, autism refers to the classic autistic disorder; in clinical practice, though, autism, ASD, and PDD are often used interchangeably. ASD, in turn, is a subset of the broader autism phenotype, which describes individuals who may not have ASD but do have autistic-like traits, such as avoiding eye contact.

www.numerons.in

The manifestations of autism cover a wide spectrum, ranging from individuals with severe impairments—who may be silent, mentally disabled, and locked into hand flapping and rocking—to high functioning individuals who may have active but distinctly odd social approaches, narrowly focused interests, and verbose, pedantic communication. Because the behavior spectrum is continuous, boundaries between diagnostic categories are necessarily somewhat arbitrary. Sometimes the syndrome is divided into low-, medium- or high-functioning autism (LFA, MFA, and HFA), based on IQ thresholds, or on how much support the individual requires in daily life; these subdivisions are not standardized and are controversial. Autism can also be divided into syndromal and non-syndromal autism; the syndromal autism is associated with severe or profound mental retardation or a congenital syndrome with physical symptoms, such as tuberous sclerosis. Although individuals with Asperger syndrome tend to perform better cognitively than those with autism, the extent of the overlap between Asperger syndrome, HFA, and non-syndromal autism is unclear.

Some studies have reported diagnoses of autism in children due to a loss of language or social skills, as opposed to a failure to make progress, typically from 15 to 30 months of age. The validity of this distinction remains controversial; it is possible that regressive autism is a specific subtype, or that there is a continuum of behaviors between autism with and without regression.

www.numerons.in

Research into causes has been hampered by the inability to identify biologically meaningful subpopulations and by the traditional boundaries between the disciplines of psychiatry, psychology, neurology and pediatrics. Newer technologies such as fMRI and diffusion tensor imaging can help identify biologically relevant phenotypes (observable traits) that can be viewed on brain scans, to help further neurogenetic studies of autism; one example is lowered activity in the fusiform face area of the brain, which is associated with impaired perception of people versus objects. It has been proposed to classify autism using genetics as well as behavior.

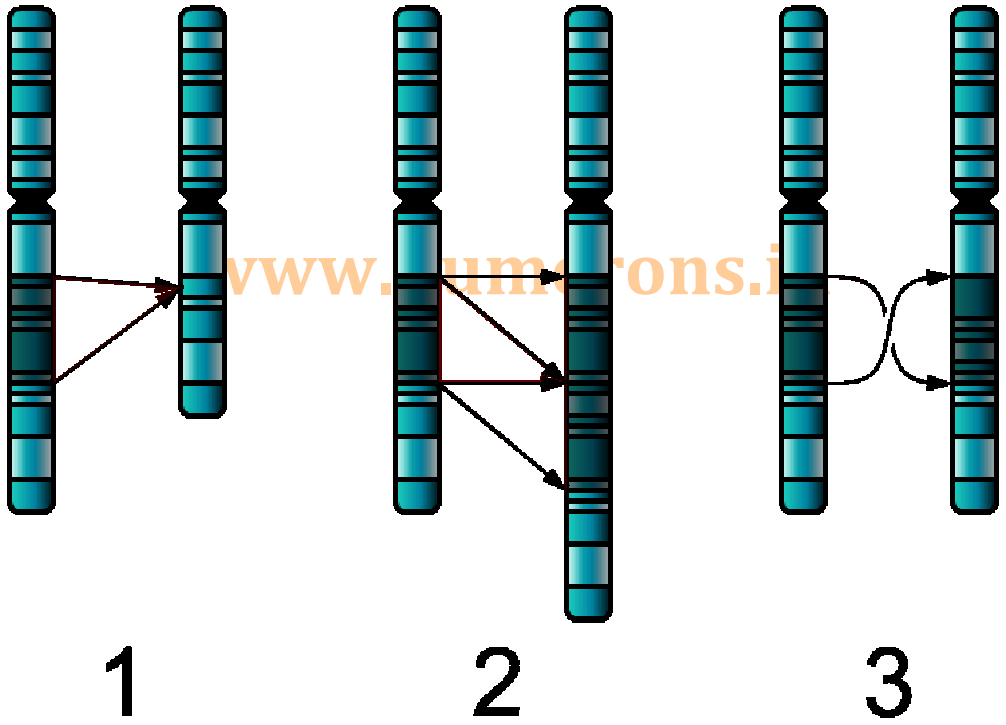
Causes

www.numerons.in

It has long been presumed that there is a common cause at the genetic, cognitive, and neural levels for autism's characteristic triad of symptoms. However, there is increasing suspicion that autism is instead a complex disorder whose core aspects have distinct causes that often co-occur.

Autism has a strong genetic basis, although the genetics of autism are complex and it is unclear whether ASD is explained more by rare mutations with major effects, or by rare multigene interactions of common genetic variants. Complexity arises due to interactions among multiple genes, the environment, and epigenetic factors which do not change DNA but are heritable and influence gene expression. Studies of twins suggest that heritability is 0.7 for autism and as high as 0.9 for ASD, and siblings of those with autism are about 25 times more likely to be autistic than the general population. However, most of the mutations that increase autism risk have not been identified. Typically, autism cannot be traced to a Mendelian (single-gene) mutation or to a single chromosome abnormality like fragile X syndrome, and none of the genetic syndromes associated with ASDs have been shown to selectively cause ASD. Numerous candidate genes have been located, with only small effects attributable to any particular gene. The large number of autistic individuals with unaffected family members may result from copy number variations—spontaneous deletions or duplications in genetic material during meiosis. Hence, a substantial fraction of autism cases may be traceable to genetic causes that are highly heritable but not inherited: that is, the mutation that causes the autism is not present in the parental genome.

www.numerons.in



Three diagrams of chromosome pairs A, B that are nearly identical. 1: B is missing a segment of A. 2: B has two adjacent copies of a segment of A. 3: B's copy of A's segment is in reverse order.

Deletion (1), duplication (2) and inversion (3) are all chromosome abnormalities that have been implicated in autism.

www.numerons.in

Several lines of evidence point to synaptic dysfunction as a cause of autism. Some rare mutations may lead to autism by disrupting some synaptic pathways, such as those involved with cell adhesion. Gene replacement studies in mice suggest that autistic symptoms are closely related to later developmental steps that depend on activity in

synapses and on activity-dependent changes. All known teratogens (agents that cause birth defects) related to the risk of autism appear to act during the first eight weeks from conception, and though this does not exclude the possibility that autism can be initiated or affected later, it is strong evidence that autism arises very early in development.

Although evidence for other environmental causes is anecdotal and has not been confirmed by reliable studies, extensive searches are underway. Environmental factors that have been claimed to contribute to or exacerbate autism, or may be important in future research, include certain foods, infectious disease, heavy metals, solvents, diesel exhaust, PCBs, phthalates and phenols used in plastic products, pesticides, brominated flame retardants, alcohol, smoking, illicit drugs, vaccines, and prenatal stress, although no links have been found, and some have been completely dis-proven.

Parents may first become aware of autistic symptoms in their child around the time of a routine vaccination. This has led to unsupported theories blaming vaccine "overload", a vaccine preservative or the MMR vaccine for causing autism. The latter theory was supported by litigation-funded study that has since been shown to have been "an elaborate fraud". Although these theories lack convincing scientific evidence and are biologically implausible, parental concern about a potential vaccine link with autism has led to lower rates of childhood immunizations, outbreaks of previously-controlled childhood diseases in some countries, and the preventable deaths of several children.

Mechanism

Autism's symptoms result from maturation-related changes in various systems of the brain. How autism occurs is not well understood. Its mechanism can be divided into two areas: the pathophysiology of brain structures and processes associated with autism, and the neuropsychological linkages between brain structures and behaviors. The behaviors appear to have multiple pathophysiologies.

Pathophysiology

Unlike many other brain disorders such as Parkinson's, autism does not have a clear unifying mechanism at either the molecular, cellular, or systems level; it is not known whether autism is a few disorders caused by mutations converging on a few common molecular pathways, or is (like intellectual disability) a large set of disorders with diverse mechanisms. Autism appears to result from developmental factors that affect many or all functional brain systems, and to disturb the timing of brain development more than the final product. Neuroanatomical studies and the associations with teratogens strongly suggest that autism's mechanism includes alteration of brain development soon after conception. This anomaly appears to start a cascade of pathological events in the brain that are significantly influenced by environmental factors. Just after birth, the brains of autistic children tend to grow faster than usual, followed by normal or relatively slower growth in childhood. It is not known whether early overgrowth occurs in all autistic children. It seems to be most prominent in brain areas underlying the development of higher cognitive

specialization. Hypotheses for the cellular and molecular bases of pathological early overgrowth include the following:

- An excess of neurons that causes local overconnectivity in key brain regions.
- Disturbed neuronal migration during early gestation.
- Unbalanced excitatory–inhibitory networks.
- Abnormal formation of synapses and dendritic spines, for example, by modulation of the neurexin–neuroligin cell-adhesion system, or by poorly regulated synthesis of synaptic proteins. Disrupted synaptic development may also contribute to epilepsy, which may explain why the two conditions are associated.

www.numerons.in

Interactions between the immune system and the nervous system begin early during the embryonic stage of life, and successful neurodevelopment depends on a balanced immune response. It is possible that aberrant immune activity during critical periods of neurodevelopment is part of the mechanism of some forms of ASD. Although some abnormalities in the immune system have been found in specific subgroups of autistic individuals, it is not known whether these abnormalities are relevant to or secondary to autism's disease processes. As autoantibodies are found in conditions other than ASD, and are not always present in ASD, the relationship between immune disturbances and autism remains unclear and controversial.

The relationship of neurochemicals to autism is not well understood; several have been investigated, with the most evidence for the role of serotonin and of genetic differences in its transport. Others have pointed to a role for group I metabotropic glutamate receptors (mGluR) in the pathogenesis of one type of autism, Fragile X. Some data suggest an increase in several growth hormones; other data argue for diminished growth factors. Also, some inborn errors of metabolism are associated with autism but probably account for less than 5% of cases.

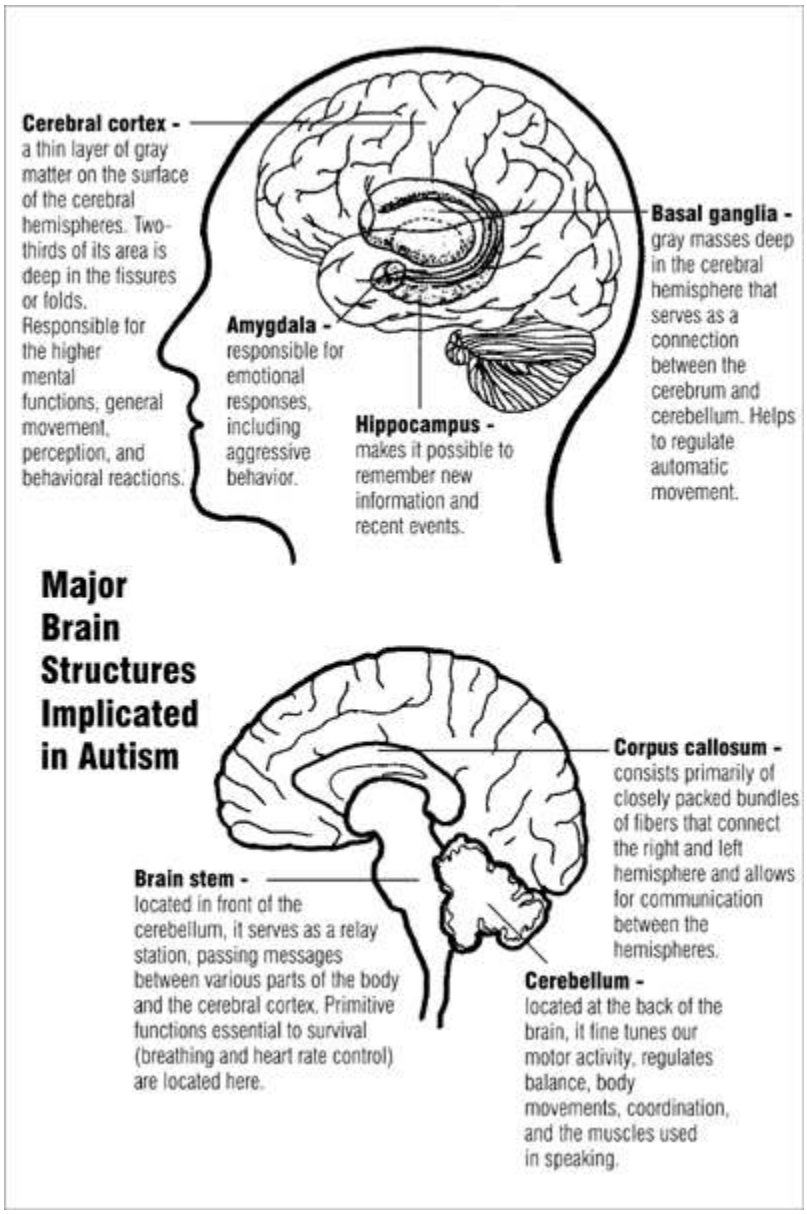
www.numerons.in

The mirror neuron system (MNS) theory of autism hypothesizes that distortion in the development of the MNS interferes with imitation and leads to autism's core features of social impairment and communication difficulties. The MNS operates when an animal performs an action or observes another animal perform the same action. The MNS may contribute to an individual's understanding of other people by enabling the modeling of their behavior via embodied simulation of their actions, intentions, and emotions. Several studies have tested this hypothesis by demonstrating structural abnormalities in MNS regions of individuals with ASD, delay in the activation in the core circuit for imitation in individuals with Asperger syndrome, and a correlation between reduced MNS activity and severity of the syndrome in children with ASD. However, individuals with autism also have abnormal brain activation in many circuits outside the MNS and the MNS theory does not explain the normal performance of autistic children on imitation tasks that involve a goal or object.

www.numerons.in

Two diagrams of major brain structures implicated in autism. The upper diagram shows the cerebral cortex near the top and the basal ganglia in the center, just above the amygdala

and hippocampus. The lower diagram shows the corpus callosum near the center, the cerebellum in the lower rear, and the brain stem in the lower center.



Autism affects the amygdala, cerebellum, and many other parts of the brain.

ASD-related patterns of low function and aberrant activation in the brain differ depending on whether the brain is doing social or nonsocial tasks. In autism there is evidence for reduced functional connectivity of the default network, a large-scale brain network involved in social and emotional processing, with intact connectivity of the task-positive network, used in sustained attention and goal-directed thinking. In people with autism the two networks are not negatively correlated in time, suggesting an imbalance in toggling between the two networks, possibly reflecting a disturbance of self-referential thought. A 2008 brain-imaging study found a specific pattern of signals in the cingulate cortex which differs in individuals with ASD.

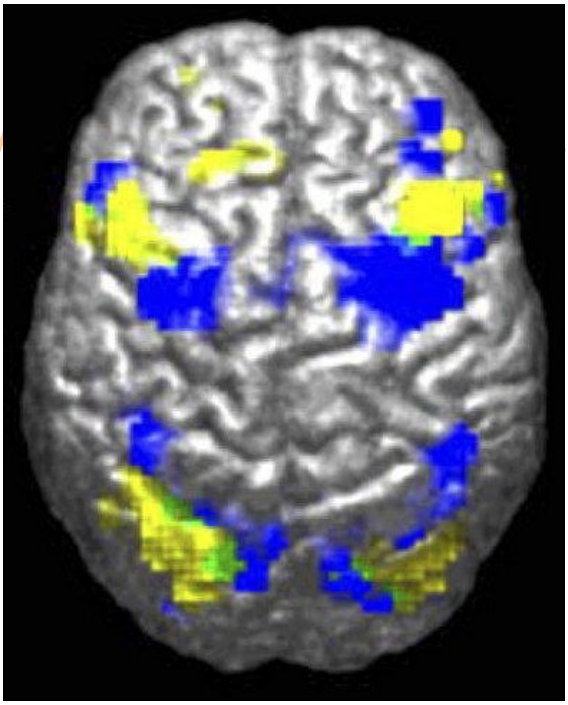
www.numerons.in

The underconnectivity theory of autism hypothesizes that autism is marked by underfunctioning high-level neural connections and synchronization, along with an excess of low-level processes. Evidence for this theory has been found in functional neuroimaging studies on autistic individuals and by a brainwave study that suggested that adults with ASD have local overconnectivity in the cortex and weak functional connections between the frontal lobe and the rest of the cortex. Other evidence suggests the underconnectivity is mainly within each hemisphere of the cortex and that autism is a disorder of the association cortex.

www.numerons.in

From studies based on event-related potentials, transient changes to the brain's electrical activity in response to stimuli, there is considerable evidence for differences in autistic individuals with respect to attention, orientiation to auditory and visual stimuli, novelty detection, language and face processing, and information storage; several studies have found a preference for non-social stimuli. For example, magnetoencephalography studies have found evidence in autistic children of delayed responses in the brain's processing of auditory signals.

A human brain viewed from above. About 10% is highlighted in yellow and 10% in blue. There is only a tiny (perhaps 0.5%) green region where they overlap.



Autistic individuals tend to use different areas of the brain (yellow) for a movement task compared to a control group (blue).

www.numerons.in

In the genetic area, relations have been found between autism and schizophrenia based on duplications and deletions of chromosomes; research showed that schizophrenia and autism are significantly more common in combination with 1q21.1 deletion syndrome.

Research on autism/schizophrenia relations for chromosome 15 (15q13.3), chromosome 16 (16p13.1) and chromosome 17 (17p12) are inconclusive.

Neuropsychology

Two major categories of cognitive theories have been proposed about the links between autistic brains and behavior.

www.numerons.in

The first category focuses on deficits in social cognition. The empathizing–systemizing theory postulates that autistic individuals can systemize—that is, they can develop internal rules of operation to handle events inside the brain—but are less effective at empathizing by handling events generated by other agents. An extension, the extreme male brain theory, hypothesizes that autism is an extreme case of the male brain, defined psychometrically as individuals in whom systemizing is better than empathizing; this extension is controversial, as many studies contradict the idea that baby boys and girls respond differently to people and objects.

These theories are somewhat related to the earlier theory of mind approach, which hypothesizes that autistic behavior arises from an inability to ascribe mental states to oneself and others. The theory of mind hypothesis is supported by autistic children's atypical responses to the Sally–Anne test for reasoning about others' motivations, and the mirror neuron system theory of autism described in Pathophysiology maps well to the hypothesis. However, most studies have found no evidence of impairment in autistic individuals' ability to understand other people's basic intentions or goals; instead, data suggests that impairments are found in understanding more complex social emotions or in considering others' viewpoints.

www.numerons.in

The second category focuses on nonsocial or general processing. Executive dysfunction hypothesizes that autistic behavior results in part from deficits in working memory, planning, inhibition, and other forms of executive function. Tests of core executive processes such as eye movement tasks indicate improvement from late childhood to adolescence, but performance never reaches typical adult levels. A strength of the theory is predicting stereotyped behavior and narrow interests; two weaknesses are that executive function is hard to measure and that executive function deficits have not been found in young autistic children.

Weak central coherence theory hypothesizes that a limited ability to see the big picture underlies the central disturbance in autism. One strength of this theory is predicting special talents and peaks in performance in autistic people. A related theory—enhanced perceptual functioning—focuses more on the superiority of locally oriented and perceptual operations in autistic individuals. These theories map well from the underconnectivity theory of autism.

www.numerons.in

Neither category is satisfactory on its own; social cognition theories poorly address autism's rigid and repetitive behaviors, while the nonsocial theories have difficulty

explaining social impairment and communication difficulties. A combined theory based on multiple deficits may prove to be more useful.

Screening

About half of parents of children with ASD notice their child's unusual behaviors by age 18 months, and about four-fifths notice by age 24 months. According to an article in the Journal of Autism and Developmental Disorders, failure to meet any of the following milestones "is an absolute indication to proceed with further evaluations. Delay in referral for such testing may delay early diagnosis and treatment and affect the long-term outcome."

www.numerons.in

- No babbling by 12 months.
- No gesturing (pointing, waving bye-bye, etc.) by 12 months.
- No single words by 16 months.
- No 2-word spontaneous (not just echolalic) phrases by 24 months.
- Any loss of any language or social skills, at any age.

US and Japanese practice is to screen all children for ASD at 18 and 24 months, using autism-specific formal screening tests. In contrast, in the UK, children whose families or doctors recognize possible signs of autism are screened. It is not known which approach is more effective. Screening tools include the Modified Checklist for Autism in Toddlers (M-CHAT), the Early Screening of Autistic Traits Questionnaire, and the First Year Inventory; initial data on M-CHAT and its predecessor CHAT on children aged 18–30 months suggests that it is best used in a clinical setting and that it has low sensitivity (many false-negatives) but good specificity (few false-positives). It may be more accurate to precede these tests with a broadband screener that does not distinguish ASD from other developmental disorders. Screening tools designed for one culture's norms for behaviors like eye contact may be inappropriate for a different culture. Although genetic screening for autism is generally still impractical, it can be considered in some cases, such as children with neurological symptoms and dysmorphic features.

www.numerons.in

Diagnosis

Diagnosis is based on behavior, not cause or mechanism. Autism is defined in the DSM-IV-TR as exhibiting at least six symptoms total, including at least two symptoms of qualitative impairment in social interaction, at least one symptom of qualitative impairment in communication, and at least one symptom of restricted and repetitive behavior. Sample symptoms include lack of social or emotional reciprocity, stereotyped and repetitive use of language or idiosyncratic language, and persistent preoccupation with parts of objects. Onset must be prior to age three years, with delays or abnormal functioning in either social interaction, language as used in social communication, or symbolic or imaginative play. The disturbance must not be better accounted for by Rett syndrome or childhood disintegrative disorder. ICD-10 uses essentially the same definition.

www.numerons.in

Several diagnostic instruments are available. Two are commonly used in autism research: the Autism Diagnostic Interview-Revised (ADI-R) is a semistructured parent interview, and the Autism Diagnostic Observation Schedule (ADOS) uses observation and interaction with the child. The Childhood Autism Rating Scale (CARS) is used widely in clinical environments to assess severity of autism based on observation of children.

A pediatrician commonly performs a preliminary investigation by taking developmental history and physically examining the child. If warranted, diagnosis and evaluations are conducted with help from ASD specialists, observing and assessing cognitive, communication, family, and other factors using standardized tools, and taking into account any associated medical conditions. A pediatric neuropsychologist is often asked to assess behavior and cognitive skills, both to aid diagnosis and to help recommend educational interventions. A differential diagnosis for ASD at this stage might also consider mental retardation, hearing impairment, and a specific language impairment such as Landau–Kleffner syndrome. The presence of autism can make it harder to diagnose coexisting psychiatric disorders such as depression.

Clinical genetics evaluations are often done once ASD is diagnosed, particularly when other symptoms already suggest a genetic cause. Although genetic technology allows clinical geneticists to link an estimated 40% of cases to genetic causes, consensus guidelines in the US and UK are limited to high-resolution chromosome and fragile X testing. A genotype-first model of diagnosis has been proposed, which would routinely assess the genome's copy number variations. As new genetic tests are developed several ethical, legal, and social issues will emerge. Commercial availability of tests may precede adequate understanding of how to use test results, given the complexity of autism's genetics. Metabolic and neuroimaging tests are sometimes helpful, but are not routine.

ASD can sometimes be diagnosed by age 14 months, although diagnosis becomes increasingly stable over the first three years of life: for example, a one-year-old who meets diagnostic criteria for ASD is less likely than a three-year-old to continue to do so a few years later. In the UK the National Autism Plan for Children recommends at most 30 weeks from first concern to completed diagnosis and assessment, though few cases are handled that quickly in practice. A 2009 US study found the average age of formal ASD diagnosis was 5.7 years, far above recommendations, and that 27% of children remained undiagnosed at age 8 years. Although the symptoms of autism and ASD begin early in childhood, they are sometimes missed; years later, adults may seek diagnoses to help them or their friends and family understand themselves, to help their employers make adjustments, or in some locations to claim disability living allowances or other benefits.

Underdiagnosis and overdiagnosis are problems in marginal cases, and much of the recent increase in the number of reported ASD cases is likely due to changes in diagnostic practices. The increasing popularity of drug treatment options and the expansion of benefits has given providers incentives to diagnose ASD, resulting in some overdiagnosis of children with uncertain symptoms. Conversely, the cost of screening and diagnosis and the challenge of obtaining payment can inhibit or delay diagnosis. It is particularly hard to diagnose autism among the visually impaired, partly because some of its diagnostic criteria

www.numerons.in

depend on vision, and partly because autistic symptoms overlap with those of common blindness syndromes or blindisms.

Management

A young child points, in front of a woman who smiles and points in the same direction.

A three-year-old with autism points to fish in an aquarium, as part of an experiment on the effect of intensive shared-attention training on language development.

The main goals when treating children with autism are to lessen associated deficits and family distress, and to increase quality of life and functional independence. No single treatment is best and treatment is typically tailored to the child's needs. Families and the educational system are the main resources for treatment. Studies of interventions have methodological problems that prevent definitive conclusions about efficacy. Although many psychosocial interventions have some positive evidence, suggesting that some form of treatment is preferable to no treatment, the methodological quality of systematic reviews of these studies has generally been poor, their clinical results are mostly tentative, and there is little evidence for the relative effectiveness of treatment options. Intensive, sustained special education programs and behavior therapy early in life can help children acquire self-care, social, and job skills, and often improve functioning and decrease symptom severity and maladaptive behaviors; claims that intervention by around age three years is crucial are not substantiated. Available approaches include applied behavior analysis (ABA), developmental models, structured teaching, speech and language therapy, social skills therapy, and occupational therapy.

www.numerons.in

Educational interventions can be effective to varying degrees in most children: intensive ABA treatment has demonstrated effectiveness in enhancing global functioning in

preschool children and is well-established for improving intellectual performance of young children. Neuropsychological reports are often poorly communicated to educators, resulting in a gap between what a report recommends and what education is provided. It is not known whether treatment programs for children lead to significant improvements after the children grow up, and the limited research on the effectiveness of adult residential programs shows mixed results. The appropriateness of including children with varying severity of autism spectrum disorders in the general education population is a subject of current debate among educators and researchers.

www.numerons.in

Many medications are used to treat ASD symptoms that interfere with integrating a child into home or school when behavioral treatment fails. More than half of US children diagnosed with ASD are prescribed psychoactive drugs or anticonvulsants, with the most common drug classes being antidepressants, stimulants, and antipsychotics. Aside from antipsychotics, there is scant reliable research about the effectiveness or safety of drug treatments for adolescents and adults with ASD. A person with ASD may respond atypically to medications, the medications can have adverse effects, and no known medication relieves autism's core symptoms of social and communication impairments. Experiments in mice have reversed or reduced some symptoms related to autism by replacing or modulating gene function, suggesting the possibility of targeting therapies to specific rare mutations known to cause autism.

Although many alternative therapies and interventions are available, few are supported by scientific studies. Treatment approaches have little empirical support in quality-of-life contexts, and many programs focus on success measures that lack predictive validity and real-world relevance. Scientific evidence appears to matter less to service providers than program marketing, training availability, and parent requests. Some alternative treatments may place the child at risk. A 2008 study found that compared to their peers, autistic boys have significantly thinner bones if on casein-free diets; in 2005, botched chelation therapy killed a five-year-old child with autism.

www.numerons.in

Treatment is expensive; indirect costs are more so. For someone born in 2000, a US study estimated an average lifetime cost of $3.77 million (net present value in 2011 dollars, inflation-adjusted from 2003 estimate), with about 10% medical care, 30% extra education and other care, and 60% lost economic productivity. Publicly supported programs are often inadequate or inappropriate for a given child, and unreimbursed out-of-pocket medical or therapy expenses are associated with likelihood of family financial problems; one 2008 US study found a 14% average loss of annual income in families of children with ASD, and a related study found that ASD is associated with higher probability that child care problems will greatly affect parental employment. US states increasingly require private health insurance to cover autism services, shifting costs from publicly funded education programs to privately funded health insurance. After childhood, key treatment issues include residential care, job training and placement, sexuality, social skills, and estate planning.

www.numerons.in

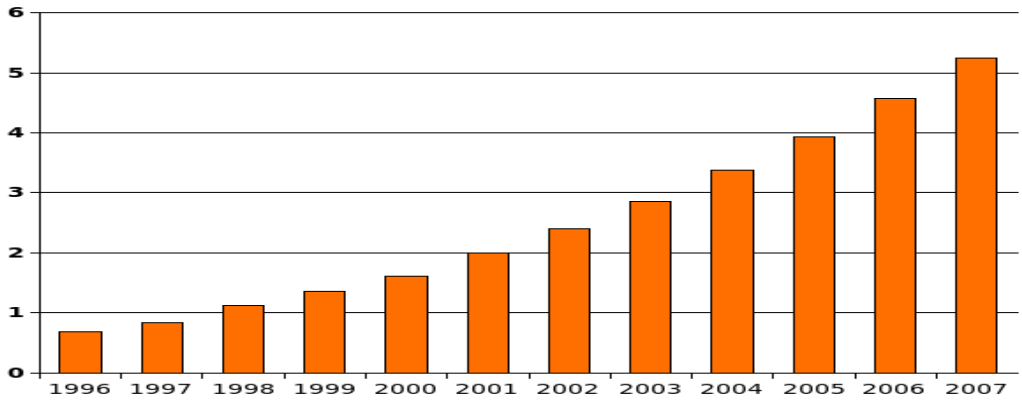
Prognosis

There is no known cure. Children recover occasionally, so that they lose their diagnosis of ASD; this occurs sometimes after intensive treatment and sometimes not. It is not known how often recovery happens; reported rates in unselected samples of children with ASD have ranged from 3% to 25%. Most autistic children can acquire language by age 5 or younger, though a few have developed communication skills in later years. Most children with autism lack social support, meaningful relationships, future employment opportunities or self-determination. Although core difficulties tend to persist, symptoms often become less severe with age. Few high-quality studies address long-term prognosis. Some adults show modest improvement in communication skills, but a few decline; no study has focused on autism after midlife. Acquiring language before age six, having an IQ above 50, and having a marketable skill all predict better outcomes; independent living is unlikely with severe autism. A 2004 British study of 68 adults who were diagnosed before 1980 as autistic children with IQ above 50 found that 12% achieved a high level of independence as adults, 10% had some friends and were generally in work but required some support, 19% had some independence but were generally living at home and needed considerable support and supervision in daily living, 46% needed specialist residential provision from facilities specializing in ASD with a high level of support and very limited autonomy, and 12% needed high-level hospital care. A 2005 Swedish study of 78 adults that did not exclude low IQ found worse prognosis; for example, only 4% achieved independence. A 2008 Canadian study of 48 young adults diagnosed with ASD as preschoolers found outcomes ranging through poor (46%), fair (32%), good (17%), and very good (4%); 56% of these young adults had been employed at some point during their lives, mostly in volunteer, sheltered or part-time work. Changes in diagnostic practice and increased availability of effective early intervention make it unclear whether these findings can be generalized to recently diagnosed children.

www.numerons.in

Epidemiology

Bar chart versus time. The graph rises steadily from 1996 to 2007, from about 0.7 to about 5.3. The trend curves slightly upward.



Reports of autism cases per 1,000 children grew dramatically in the US from 1996 to 2007. It is unknown how much, if any, growth came from changes in autism's prevalence.

Most recent reviews tend to estimate a prevalence of 1–2 per 1,000 for autism and close to 6 per 1,000 for ASD; because of inadequate data, these numbers may underestimate ASD's true prevalence. PDD-NOS's prevalence has been estimated at 3.7 per 1,000, Asperger syndrome at roughly 0.6 per 1,000, and childhood disintegrative disorder at 0.02 per 1,000. The number of reported cases of autism increased dramatically in the 1990s and early 2000s. This increase is largely attributable to changes in diagnostic practices, referral patterns, availability of services, age at diagnosis, and public awareness, though unidentified environmental risk factors cannot be ruled out. The available evidence does not rule out the possibility that autism's true prevalence has increased; a real increase would suggest directing more attention and funding toward changing environmental factors instead of continuing to focus on genetics.

www.numerons.in

Boys are at higher risk for ASD than girls. The sex ratio averages 4.3:1 and is greatly modified by cognitive impairment: it may be close to 2:1 with mental retardation and more than 5.5:1 without. Although the evidence does not implicate any single pregnancy-related risk factor as a cause of autism, the risk of autism is associated with advanced age in either parent, and with diabetes, bleeding, and use of psychiatric drugs in the mother during pregnancy. The risk is greater with older fathers than with older mothers; two potential explanations are the known increase in mutation burden in older sperm, and the hypothesis that men marry later if they carry genetic liability and show some signs of autism. Most professionals believe that race, ethnicity, and socioeconomic background do not affect the occurrence of autism.

Several other conditions are common in children with autism. They include:

www.numerons.in

- Genetic disorders. About 10–15% of autism cases have an identifiable Mendelian (single-gene) condition, chromosome abnormality, or other genetic syndrome, and ASD is associated with several genetic disorders.
- Mental retardation. The fraction of autistic individuals who also meet criteria for mental retardation has been reported as anywhere from 25% to 70%, a wide variation illustrating the difficulty of assessing autistic intelligence. For ASD other than autism, the association with mental retardation is much weaker.
- Anxiety disorders are common among children with ASD; there are no firm data, but studies have reported prevalences ranging from 11% to 84%. Many anxiety disorders have symptoms that are better explained by ASD itself, or are hard to distinguish from ASD's symptoms.
- Epilepsy, with variations in risk of epilepsy due to age, cognitive level, and type of language disorder.
- Several metabolic defects, such as phenylketonuria, are associated with autistic symptoms.
- Minor physical anomalies are significantly increased in the autistic population.
- Preempted diagnoses. Although the DSM-IV rules out concurrent diagnosis of many other conditions along with autism, the full criteria for ADHD, Tourette syndrome, and other of these conditions are often present and these comorbid diagnoses are increasingly accepted.

www.numerons.in

- Sleep problems affect about two-thirds of individuals with ASD at some point in childhood. These most commonly include symptoms of insomnia such as difficulty in falling asleep, frequent nocturnal awakenings, and early morning awakenings. Sleep problems are associated with difficult behaviors and family stress, and are often a focus of clinical attention over and above the primary ASD diagnosis.

History

www.numerons.in

Head and shoulders of a man in his early 60s in coat and tie, facing slightly to his right. He is balding and has a serious but slightly smiling expression.

Leo Kanner introduced the label early infantile autism in 1943.

A few examples of autistic symptoms and treatments were described long before autism was named. The Table Talk of Martin Luther, compiled by his notetaker, Mathesius, contains the story of a 12-year-old boy who may have been severely autistic. Luther reportedly thought the boy was a soulless mass of flesh possessed by the devil, and suggested that he be suffocated, although a later critic has cast doubt on the veracity of this report. The earliest well-documented case of autism is that of Hugh Blair of Borgue, as detailed in a 1747 court case in which his brother successfully petitioned to annul Blair's marriage to gain Blair's inheritance. The Wild Boy of Aveyron, a feral child caught in 1798, showed several signs of autism; the medical student Jean Itard treated him with a behavioral program designed to help him form social attachments and to induce speech via imitation.

The New Latin word autismus (English translation autism) was coined by the Swiss psychiatrist Eugen Bleuler in 1910 as he was defining symptoms of schizophrenia. He derived it from the Greek word autós (αὐτός, meaning self), and used it to mean morbid self-admiration, referring to "autistic withdrawal of the patient to his fantasies, against which any influence from outside becomes an intolerable disturbance".

The word autism first took its modern sense in 1938 when Hans Asperger of the Vienna University Hospital adopted Bleuler's terminology autistic psychopaths in a lecture in German about child psychology. Asperger was investigating an ASD now known as Asperger syndrome, though for various reasons it was not widely recognized as a separate diagnosis until 1981. Leo Kanner of the Johns Hopkins Hospital first used autism in its modern sense in English when he introduced the label early infantile autism in a 1943 report of 11 children with striking behavioral similarities. Almost all the characteristics described in Kanner's first paper on the subject, notably "autistic aloneness" and "insistence on sameness", are still regarded as typical of the autistic spectrum of disorders. It is not known whether Kanner derived the term independently of Asperger.

Kanner's reuse of autism led to decades of confused terminology like infantile schizophrenia, and child psychiatry's focus on maternal deprivation led to misconceptions of autism as an infant's response to "refrigerator mothers". Starting in the late 1960s autism was established as a separate syndrome by demonstrating that it is lifelong, distinguishing it from mental retardation and schizophrenia and from other developmental disorders, and demonstrating the benefits of involving parents in active programs of therapy. As late as the mid-1970s there was little evidence of a genetic role in autism; now it is thought to be one of the most heritable of all psychiatric conditions. Although the rise of parent organizations and the destigmatization of childhood ASD have deeply affected how we view ASD, parents continue to feel social stigma in situations where their autistic children's behaviors are perceived negatively by others, and many primary care physicians and medical specialists still express some beliefs consistent with outdated autism research.

The Internet has helped autistic individuals bypass nonverbal cues and emotional sharing that they find so hard to deal with, and has given them a way to form online communities and work remotely. Sociological and cultural aspects of autism have developed: some in the community seek a cure, while others believe that autism is simply another way of being.

Pivotal response therapy

Pivotal response therapy (PRT), also referred to as pivotal response treatment or pivotal response training, is a behavioral intervention therapy for autism. Pivotal response therapy advocates contend that behavior hinges on "pivotal" behavioral skills—motivation and the ability to respond to multiple cues—and that development of these skills will result in collateral behavioral improvements. In 2005, Richard Simpson of the University of Kansas identified Pivotal Response Treatment as one of the four scientifically based treatments for autism.

www.numerons.in

History

Initial attempts to treat autism were mostly unsuccessful and in the 1960s researchers began to focus on behavioral intervention therapies. Though these interventions enjoyed a degree of success, limitations included long hours needed for thousands of trials and limited generalization to new environments. Drs. Lynn and Robert Koegel incorporated ideas from the natural language procedures to develop verbal communication in children with autism. They theorized that, if effort was focused on certain pivotal responses, intervention would be more successful and efficient. As they saw it, developing these pivotal behaviors would result in widespread improvement in other areas. Pivotal Response Theory (PRT) is based on a belief that autism is a much less severe disorder than originally thought.

www.numerons.in

Theory

Pivotal Response Treatment is a naturalistic intervention model derived from the principles of Applied Behavior Analysis. Rather than target individual behaviors one at a time, PRT targets pivotal areas of a child's development such as motivation, responsivity to multiple cues, self-management, and social initiations. By targeting these critical areas, PRT results in widespread, collateral improvements in other social, communicative, and behavioral areas that are not specifically targeted.

The underlying motivational strategies of PRT are incorporated throughout intervention as often as possible, and they include child choice, task variation, interspersing maintenance tasks, rewarding attempts, and the use of direct and natural reinforcers. The child plays a crucial role in determining the activities and objects that will be used in the PRT exchange. Intentful attempts at the target behavior are rewarded with a natural reinforcer (e.g., if a child attempts a request for a stuffed animal, the child receives the animal, not a piece of candy or other unrelated reinforcer). Pivotal Response Treatment is used to teach language, decrease disruptive/self-stimulatory behaviors, and increase social, communication, and academic skills.

www.numerons.in

The two primary pivotal areas of pivotal response therapy are motivation and self-initiated activities. Three others are self-management, empathy, and the ability to respond to multiple signals, or cues. Play environments are used to teach pivotal skills, such as turn-taking, communication, and language. This training is child-directed: the child makes choices that direct the therapy. Emphasis is also placed upon the role of parents as primary intervention agents.

Simpson (2005) noted that PRT was a scientifically based practice for treating autism. The effectiveness of pivotal response therapies has been proven, but ongoing research of its effects on children with autism is being conducted.

www.numerons.in

Treatment and education of autistic and related communication handicapped children

Treatment and education of autistic and related communication handicapped children (TEACCH) is a service, training, and research program for individuals of all ages and skill levels with autism spectrum disorders. The TEACCH approach was developed at the University of North Carolina, originating in a child research project begun in 1964 by Dr Eric Schopler and Dr Robert Reichler. The results of this pilot study indicated that the children involved made good progress, and consequently state finance supported the formation of Division TEACCH. Founded in 1966 by Eric Schopler at the University of North Carolina at Chapel Hill, TEACCH provides training and services geared to helping autistic children and their families cope with the condition. With over 40 years of experience of working with autistic people, TEACCH methodology continues to evolve, refining its approach. The TEACCH philosophy recognises autism as a lifelong condition and does not aim to cure but to respond to autism as a culture. Core tenets of the TEACCH philosophy include an understanding of the effects of autism on individuals; use of assessment to assist programme design around individual strengths, skills, interests and needs; enabling the individual to be as independent as possible; working in collaboration with parents and families

www.numerons.in

The emphasis on individualization means that TEACCH does not distinguish between people with very high skill levels and those with learning disabilities. Strategies used are designed to address the difficulties faced by all people with autism, and be adaptable to whatever style and degree of support is required. TEACCH methodology is rooted in behavior therapy, more recently combining cognitive elements, guided by theories suggesting that behavior typical of people with autism results from underlying problems in perception and understanding. The strategies put forward by TEACCH do not work on the behavior directly, but on its underlying reasons, such as lack of understanding of what the person is expected to do or what will happen to them next, and sensory under- or over-stimulation. By addressing communication deficits, the person will be supported to express their needs and feelings by means other than challenging behavior.

www.numerons.in

Working from the premise that people with autism are predominantly visual learners, intervention strategies are based around physical and visual structure, schedules, work systems and task organisation. Individualised systems aim to address difficulties with communication, organisation, generalisation, concepts, sensory processing, change and relating to others. Whereas some interventions focus on addressing areas of weakness, the TEACCH approach works with existing strengths and emerging skill areas and employs alternative and augmentative communication techniques in a supportive environment.

www.numerons.in

Most of the literature is of North American origin. The adoption of the TEACCH approach elsewhere has been later to begin. In 1993, Jones et al. stated that there was insufficient use of the TEACCH approach in the UK to include it in their study of interventions. However, five years later Jordan, Jones and Murray describe TEACCH as the most common intervention used with children with autism in the UK.

TEACCH runs conferences in North Carolina and organizes programs throughout the USA and in the UK.

Research

TEACCH has been running for several decades and a range of studies indicates that it is an effective intervention for autism, although the studies did not meet all the criteria to qualify TEACCH unreservedly as evidence based practice.

www.numerons.in

Concerns have been raised about the influence on intervention outcomes from staff member skills and experience.

"Structured teaching is an important priority because of the TEACCH research and experience that structure fits the "culture of autism" more effectively than any other techniques we have observed. Organising the physical environment, developing schedules and work systems, making expectations clear and explicit, and using visual materials have been effective ways of developing skills and allowing people with autism to use these skills independently of direct adult prompting and cueing. These priorities are especially important for students with autism who are frequently held back by their inability to work independently in a variety of situations. Structured teaching says nothing about where people with autism should be educated; this is a decision based on the skills and needs of each individual student. Some can work effectively and benefit from regular educational programs, while others will need special classrooms for part or all of the day where the physical environment, curriculum and personnel can be organised and manipulated to reflect individual needs."

www.numerons.in

Apart from two outcome studies most findings relate to the use of TEACCH with people with additional learning disability, and the focus of most studies is with children.

The TEACCH structured teaching approach can be regarded as combining a range of prosthetic devices to support the individual with autism to manage their life as independently as possible. Schopler et al. identified studies of differing methods of using structured teaching in non-TEACCH educational programmes with children with a range of diagnoses. All of these studies are reported as supporting the efficacy of structured teaching.

Schopler, Brehm, Kinsbourne and Reichler compared four children with autism in structured and unstructured teaching situations. They found that two of the children learned more in structured situations, these being those children at earlier developmental stages. These results are supported by a larger comparative study in a range of three settings with varying levels of structure. However the presence of a higher initial mean IQ level (66) in the structured group compared to the comparison groups (48 and 52) may have been influential.

www.numerons.in

Schopler et al. examined parent reports of the effectiveness of structured teaching within the TEACCH programme. Questionnaires from 348 families completed between 1966 and 1977 were analysed. 96% of the families with older children reported that their children were still living in the local community. This compared to between 26% and 61% of adolescents with autism in contemporaneous follow-up studies in other settings.

In a study comparing the behavior of children with autism in the period between referral to a psychiatrist and diagnosis with their behavior during a similar time period after structured teaching had been implemented by parents, Short reported a significant reduction in inappropriate behaviors.

www.numerons.in

Ozonoff and Cathcart studied two groups of 11 children matched by diagnosis, age and severity of autism. One group provided a control, receiving only a discrete trial school-based programme, while the experimental group received an additional home-based TEACCH programme for 4 months. Pre- and post-testing using PEP-R identified that the experimental group made an overall improvement 3 to 4 times greater than the control group in motor skills, imitation and non-verbal conceptual skills.

A criticism of the evidence base for TEACCH is the lack of independent studies. However a number of studies, notably from Europe and Japan do exist. Notomi reports on five case studies using TEACCH interventions in Japan. In each case the behavior (repeated emptying of a toy box, stripping in class, encopresis, throwing clothing from a high-rise balcony, flooding irrigation systems) was reported as being successfully extinguished. However these were not controlled trials and no standard objective assessment tool was used.

www.numerons.in

Kielinen et al. found that 43.9% of 187 children with autism aged between 3- and 18-years-old in their study in northern Finland were receiving TEACCH. Though some improvement was reported, results were not significantly higher than for any other intervention identified in the study, and were further compromised by the fact that 82.9% of those in the study were receiving more than one intervention. Similarly Sheehy's finding of substantial improvements in a range of motor, perception and cognition skills in the Barnardo's preschool programme in Northern Ireland acknowledges that other strategies were in evidence, compromising the integrity of TEACCH implementation. A reported study from France is also compromised by lack of treatment integrity, using TEACCH approaches in a broader package of intervention.

Sines evaluated classrooms against the Division TEACCH classroom checklist to support intervention integrity. His study involved a convenience sample of 19 children from TEACCH classrooms in four special schools in Northern Ireland. A single pupil from a non-TEACCH classroom was included in the study as a control. In addition six adults with autism and one with a non-specific communication disability were identified by a day service using TEACCH. All parents of the children and adults were interviewed, and 53 professional support staff involved with the participants were sent questionnaires; 28 of these being returned. In measuring the effectiveness of TEACCH, 79% of respondents described TEACCH as effectively reducing inappropriate behaviour. Additionally other

www.numerons.in

areas of improvement were noted by 86% in self-help skills, 73% in social skills, 82% in fine motor skills, 60% in gross motor skills and 90% in communication skills.

Findings supporting the effectiveness of TEACCH programmes were confirmed in a later study comparing a TEACCH programme to a normal Italian school programme (not autism specific) in an evaluative study by Panerai, Ferrante and Zingale. Sixteen participants were allocated to two groups matched by age, gender, IQ and diagnosis. The PEP-R and Vineland Adaptive Behaviour Scales (VABS) were administered at baseline and after a one-year interval. The PEP-R scores of the experimental (TEACCH) group showed statistically significant increase in all categories except fine motor skills. The control group scores showed an increase in hand-eye co-ordination only. The VABS results showed statistically significant improvement in total daily living skills for both groups, but only in the experimental group for overall total. There was no significant change in challenging behavior for either group, though a previous study evaluating the use of TEACCH with 18 children and adolescents with autism reported a notable reduction in challenging behaviors during structured activities compared to during non-structured activities. Although this study did not use a control group, the researchers found overall improvements in behavior and communication after 12 months and 18 months of a TEACCH programme. Alongside the treatment integrity issues highlighted in some independent studies (e.g.), therapist drift may also impact on outcome validity. Outside of the controlled environment of Division TEACCH services, a model for supporting integrity of strategies from training room to practice has been proposed by Chatwin and Rattley.

www.numerons.in

Jordan describes the literature on TEACCH as providing 'very positive, but not remarkable, results'. Though there are studies involving control groups (e.g.), thorough scientific validation of the TEACCH approach is scarce. However there has been no objective study finding it to be ineffective, harmful nor leading to unintended consequences. From published reviews of interventions for people with autism a consensus of effective features can be identified. These include parental involvement, early intervention, developing communication skills, joint attention and social understanding; and using the individual's strengths and interests. In these terms the TEACCH methodology uses appropriate techniques to address appropriate issues.

Floortime

Floortime/DIR (Developmental, Individual differences, Relationship-based) approach is a developmental intervention for children experiencing developmental delays due to autism, Asperger syndrome, or other developmental disorders. Floortime involves meeting a child at his or her current developmental level, and building upon a particular set of strengths. Floortime is child-focused—the parent or therapist follows the child's lead, with playful positive attention and tuning in to the child's interests. Proponents of Floortime claim that by entering into a child's world, support can be given to climb the 'developmental ladder'.

www.numerons.in

The DIR model is based on the idea that due to individual processing differences children with ASD do not master the early developmental milestones that are the foundations of

learning. DIR outlines six core developmental stages that children with ASD have often missed or not mastered:

- Stage One: Regulation and Interest in the World: Being calm and feeling well enough to attend to a caregiver and surroundings. Have shared attention.
- Stage Two: Engagement and Relating: Interest in another person and in the world, developing a special bond with preferred caregivers. Distinguishing inanimate objects from people.
- Stage Three: Two way intentional communication: Simple back and forth interactions between child and caregiver. Smiles, tickles, anticipatory play.
- Stage Four: Social Problem solving: Using gestures, interaction, babble to indicate needs, wants, pleasure, upset. Get a caregiver to help with a problem. Using pre-language skills to show intention.
- Stage Five: Symbolic Play: Using words, pictures, symbols to communicate an intention, idea. Communicate ideas and thoughts, not just wants and needs.
- Stage Six: Bridging Ideas: This stage is the foundation of logic, reasoning, emotional thinking and a sense of reality.

Most typically developing children have mastered these stages by age 5 years. However, children with ASD struggle with or have missed some of these vital developmental stages. When these foundational abilities are strengthened through the child's lead and through meaningful play with a caregiver, children begin to climb up the developmental ladder. An introduction to DIR/Floortime can be found in the book - Engaging Autism: Using the Floortime Approach to Help Children Relate, Communicate, and Think. By Stanley Greenspan, M.D. and Serena Wieder, PhD.

www.numerons.in

While interventions such as Applied Behavior Analysis (ABA) and the Lovaas technique have proved effective as interventions for autism spectrum disorders, new types of developmental interventions such as Floortime have emerged in response to criticisms that the rote learning involved with behavioral interventions may not result in generalized learning.

Special education

Special education is the education of students with special needs in a way that addresses the students' individual differences and needs. Ideally, this process involves the individually planned and systematically monitored arrangement of teaching procedures, adapted equipment and materials, accessible settings, and other interventions designed to help learners with special needs achieve a higher level of personal self-sufficiency and success in school and community than would be available if the student were only given access to a typical classroom education.

www.numerons.in

Common special needs include challenges with learning, communication challenges, emotional and behavioral disorders, physical disabilities, and developmental disorders. Students with these kinds of special needs are likely to benefit from additional educational

services such as different approaches to teaching, use of technology, a specifically adapted teaching area, or resource room.

Intellectual giftedness is a difference in learning and can also benefit from specialized teaching techniques or different educational programs, but the term "special education" is generally used to specifically indicate instruction of students whose special needs reduce their ability to learn independently or in an ordinary classroom, and gifted education is handled separately.

www.numerons.in

In most developed countries, educators are modifying teaching methods and environments so that the maximum number of students are served in general education environments. Special education in developed countries is often regarded less as a "place" and more as "a range of services, available in every school." Integration can reduce social stigmas and improve academic achievement for many students.

The opposite of special education is general education. General education is the standard curriculum presented with standard teaching methods and without additional supports.

Identifying students with special needs

Some children are easily identified as candidates for special needs from their medical history. They may have been diagnosed with a genetic condition that is associated with mental retardation, may have various forms of brain damage, may have a developmental disorder, may have visual or hearing disabilities, or other disabilities.

www.numerons.in

Among students whose identification is less obvious, such as students with learning difficulties, two primary methods have been used for identifying them: the discrepancy model and the response to intervention model. The discrepancy model depends on the teacher noticing that the students' achievements are noticeably below what is expected. The response to intervention model advocates earlier intervention.

In the discrepancy model, a student receives special educational services for a specific learning difficulty (SLD) if and only if the student has at least normal intelligence and the student's academic achievement is below what is expected of a student with his or her IQ. Although the discrepancy model has dominated the school system for many years, there has been substantial criticism of this approach (e.g., Aaron, 1995, Flanagan and Mascolo, 2005) among researchers. One reason for criticism is that diagnosing SLDs on the basis of the discrepancy between achievement and IQ does not predict the effectiveness of treatment. Low academic achievers who also have low IQ appear to benefit from treatment just as much as low academic achievers who have normal or high intelligence.

www.numerons.in

The alternative approach, response to intervention, identifies children who are having difficulties in school in their first or second year after starting school. They then receive additional assistance such as participating in a reading remediation program. The response of the children to this intervention then determines whether they are designated as having a learning disability. Those few who still have trouble may then receive designation and

further assistance. Sternberg (1999) has argued that early remediation can greatly reduce the number of children meeting diagnostic criteria for learning disabilities. He has also suggested that the focus on learning disabilities and the provision of accommodations in school fails to acknowledge that people have a range of strengths and weaknesses and places undue emphasis on academics by insisting that people should be propped up in this arena and not in music or sports.

Individual needs

www.numerons.in

A special education program should be customized to address each individual student's unique needs. Special educators provide a continuum of services, in which students with special needs receive services in varying degrees based on their individual needs. Special education programs need to be individualized so that they address the unique combination of needs in a given student.

In the United States, Canada, and the UK, educational professionals used the initialism IEP when referring to a student's individualized education plan.

Students with special needs are assessed to determine their specific strengths and weaknesses. Placement, resources, and goals are determined on the basis of the student's needs. Accommodations and Modifications to the regular program may include changes in curriculum, supplementary aides or equipment, and the provision of specialized physical adaptations that allow students to participate in the educational environment to the fullest extent possible. Students may need this help to access subject matter, to physically gain access to the school, or to meet their emotional needs. For example, if the assessment determines that the student cannot write by hand because of a physical disability, then the school might provide a computer for typing assignments, or allow the student to answer questions orally instead. If the school determines that the student is severely distracted by the normal activities in a large, busy classroom, then the student might be placed in a smaller classroom such as a resource room.

www.numerons.in

Methods of provision

PS 721, a special school in Brooklyn, New York exclusively for the education of students with special needs.

Schools use different approaches to providing special education services to identified students. These can be broadly grouped into four categories, according to whether and how much contact the student with special needs has with non-disabled students (using North American terminology):

www.numerons.in

- Inclusion: In this approach, students with special educational needs spend all, or at least more than half, of the school day with students who do not have special educational needs. Because inclusion can require substantial modification of the general curriculum, most schools use it only for selected students with mild to moderate special needs, for which is accepted as a best practice. Specialized services

may be provided inside or outside the regular classroom, depending on the type of service. Students may occasionally leave the regular classroom to attend smaller, more intensive instructional sessions in a resource room, or to receive other related services that might require specialized equipment or might be disruptive to the rest of the class, such as speech and language therapy, occupational therapy, physical therapy, or might require greater privacy, such as counseling sessions with a social worker.

- Mainstreaming refers to the practice of educating students with special needs in classes with non-disabled students during specific time periods based on their skills. Students with special needs are segregated in separate classes exclusively for students with special needs for the rest of the school day.
- Segregation in a separate classroom or special school exclusively for students with special needs: In this model, students with special needs spend no time in classes with non-disabled students. Segregated students may attend the same school where regular classes are provided, but spend all instructional time exclusively in a separate classroom for students with special needs. If their special class is located in an ordinary school, they may be provided opportunities for social integration outside the classroom, e.g., by eating meals with non-disabled students. Alternatively, these students may attend a special school.
- Exclusion: A student who does not receive instruction in any school is excluded from school. Historically, most students with special needs have been excluded from school, and such exclusion may still occur where there is no legal mandate for special education services, such as in developing countries. It may also occur when a student is in hospital, housebound, or detained by the criminal justice system. These students may receive one-on-one instruction or group instruction. Students who have been suspended or expelled are not considered excluded in this sense.

www.numerons.in

Special schools

A special school is a school catering for students who have special educational needs due to severe learning difficulties, physical disabilities or behavioural problems. Special schools may be specifically designed, staffed and resourced to provide the appropriate special education for children with additional needs. Students attending special schools generally do not attend any classes in mainstream schools.

Special schools provide individualised education, addressing specific needs. Student:teacher ratios are kept low, often 6:1 or lower depending upon the needs of the children. Special schools will also have other facilities for the development of children with special needs, such as soft play areas, sensory rooms, or swimming pools, which are vital for the therapy of certain conditions.

www.numerons.in

In recent times, places available in special schools are declining as more children with special needs are educated in mainstream schools. There will always be some children, however, whose learning needs are not appropriately met in a regular classroom setting and will require specialised education and resources to provide the level of support they require. An example of a special need that may require the intensive services a special

school provides is mental retardation. However this practice is often frowned upon by school districts in the USA in the light of Least Restrictive Environment as mandated in the Individuals with Disabilities Education Act.

In the United States, an alternative is a special classroom, also called a self-contained classroom, which is a separate room dedicated solely to the education of students with special needs within a larger school that also provides general education. These classrooms are typically staffed by specially trained teachers, who provide specific, individualized instruction to individuals and small groups of students with special needs. Self-contained classrooms, because they are located in a general education school, may have students who remain in the self-contained classroom full time, or students who are included in certain general education classes. In the United States a part-time alternative that is appropriate for some students is sometimes called a resource room.

www.numerons.in

History of special schools

One of the first special schools in the world was the Institut National des Jeunes Aveugles in Paris, which was founded in 1784. It was the first school in the world to teach blind students. The first school in U.K, for the Deaf was established c1767? in Edinburgh by Thomas Braidwood.

In the 19th Century, people with disabilities and the inhumane conditions where they were supposed to be housed and educated were addressed in the literature of Charles Dickens. Dickens characterized people with severe disabilities as having the same—if not more—compassion and insight in Bleak House and Little Dorrit.

www.numerons.in

Such attention to the downtrodden conditions of people with disabilities brought with it reforms in Europe including the re-evalutation of special schools. In the United States reform came slower. Throughout the mid half of the 20th century, special schools, termed institutions, were not only acceptable they were encouraged. Students with disabilites were housed with people with mental illness, and little if any education took place.

With the Amendments to the Individuals with Disabilities Act of 1997, school districts in the United States began to slowly integrate students with moderate and severe special needs into regular school systems. This changed the form and function of special education services in many school districts and special schools subsequently saw a steady decrease in enrollment as districts weighed the cost per student. It also posed general funding dilemmas to certain local schools and districts, changed how schools view assessments, and formally introduced the concept of inclusion to many educators, students and parents.

Instructional strategies

www.numerons.in

Different instructional techniques are used for some students with special educational needs. Instructional strategies are classified as being either accommodations or modifications.

An accommodation is a reasonable adjustment to teaching practices so that the student learns the same material, but in a format that is accessible to the student. Accommodations may be classified by whether they change the presentation, response, setting, or scheduling. For example, the school may accommodate a student with visual impairments by providing a large-print textbook; this is a presentation accommodation.

A modification changes or adapts the material to make it simpler. Modifications may change what is learned, how difficult the material is, what level of mastery the student is expected to achieve, whether and how the student is assessed, or any another aspect of the curriculum. For example, the school may modify a reading assignment for a student with reading difficulties by substituting a shorter, easier book. A student may receive both accommodations and modifications.

www.numerons.in

Examples of modifications

- Skipping subjects: Students may be taught less information than typical students, skipping over material that the school deems inappropriate for the student's abilities or less important than other subjects. For example, students whose fine motor skills are weak may be taught to print block letters, but not cursive handwriting.
- Simplified assignments: Students may read the same literature as their peers but have a simpler version, for example Shakespeare with both the original text and a modern paraphrase available.
- Shorter assignments: Students may do shorter homework assignments or take shorter, more concentrated tests, e.g. 10 math problems instead of 30.
- Extra aids: If students have deficiencies in working memory, a list of vocabulary words, called a word bank, can be provided during tests, to reduce lack of recall and increase chances of comprehension. Students might use a calculator when other students are not.
- Extended time: Students with lower processing speed may benefit from extended time in assignments and/or tests in order to comprehend questions, recall information, and synthesize knowledge.

www.numerons.in

Examples of accommodations

- Response accommodations: Typing homework assignments rather than hand-writing them (considered a modification if the subject is learning to write by hand). Having someone else write down answers given verbally.
- Presentation accommodations: Listening to audio books rather than reading printed books. Agencies like Recording for the Blind and Dyslexic in America and RNIB National Library Service in the UK offer a variety of titles on tape and CD. These may be used as substitutes for the text, or as supplements intended to bolster the students' reading fluency and phonetic skills. Similar options include designating a person to read text to the student, or providing text to speech software. (Considered a modification if the purpose of the assignment is reading skills acquisition).

Designating a person to take notes during lectures. Using a talking calculator rather than one with only a visual display.

- Setting accommodations: Taking a test in a quieter room. Moving the class to a room that is physically accessible, e.g., on the first floor of a building or near an elevator. Arranging seating assignments to benefit the student, e.g., by sitting at the front of the classroom.
- Scheduling accommodations: Students may be given rest breaks or extended time on tests (may be considered a modification, if speed is a factor in the test).

www.numerons.in

All developed countries permit or require some degree of accommodation for students with special needs, and special provisions are usually made in examinations which take place at the end of formal schooling.

In addition to how the student is taught the academic curriculum, schools may provide non-academic services to the student. These are intended ultimately to increase the student's personal and academic abilities. Related services include developmental, corrective, and other supportive services as are required to assist a student with special needs and includes speech and language pathology, audiology, psychological services, physical therapy, occupational therapy, counseling services, including rehabilitation counseling, orientation and mobility services, medical services as defined by regulations, parent counseling and training, school health services, school social work, assistive technology services, other appropriate developmental or corrective support services, appropriate access to recreation and other appropriate support services. In some countries, most related services are provided by the schools; in others, they are provided by the normal healthcare and social services systems.

www.numerons.in

As an example, students who have autistic spectrum disorders, poor impulse control, or other behavioral challenges may learn self-management techniques, be kept closely on a comfortingly predictable schedule, or given extra cues to signal activities.

Issues

At-risk students (those with educational needs that are not associated with a disability) are often placed in classes with students who have disabilities. Critics assert that placing at-risk students in the same classes as students with disabilities may impede the educational progress of people with disabilities. Some special education classes have been criticized for a watered-down curriculum.

The practice of inclusion (in mainstream classrooms) has been criticized by advocates and some parents of children with special needs because some of these students require instructional methods that differ dramatically from typical classroom methods. Critics assert that it is not possible to deliver effectively two or more very different instructional methods in the same classroom. As a result, the educational progress of students who depend on different instructional methods to learn often fall even further behind their peers.

www.numerons.in

Parents of typically developing children sometimes fear that the special needs of a single "fully included" student will take critical levels of attention and energy away from the rest of the class and thereby impair the academic achievements of all students.

Some parents, advocates, and students have concerns about the eligibility criteria and their application. In some cases, parents and students protest the students' placement into special education programs. For example, a student may be placed into the special education programs due to a mental health condition such as obsessive compulsive disorder, depression, anxiety, panic attacks or ADHD, while the student and his parents believe that the condition is adequately managed through medication and outside therapy. In other cases, students whose parents believe they require the additional support of special education services are denied participation in the program based on the eligibility criteria.

Whether it is useful and appropriate to attempt to educate the most severely disabled children, such as children who are in a persistent vegetative state, is debated. While many severely disabled children can learn simple tasks, such as pushing a buzzer when they want attention, some children may be incapable of learning. Some parents and advocates say that these children would be better served by substituting improved physical care for any academic program. In other cases, they question whether teaching such non-academic subjects, such as pushing a buzzer, is properly the job of the school system, rather than the health care system.

National approaches

www.numerons.in

Africa

South Africa

White Papers in 1995 and 2001 discuss special education in the country. Local schools are given some independent authority.

Both modifications and accommodations are recommended, depending on the student's individual needs.

Asia

Japan

Japanese students with special needs are placed in one of four different school arrangements: special schools, special classrooms with another school, in resource rooms (which are called tsukyu), or in regular classrooms.

Special schools are reserved for students whose severe disabilities cannot be accommodated in the local school. They do not use the same grading or marking systems as mainstream schools, but instead assess students according to their individualized plans.

Special classes are similar, and may vary the national curriculum as the teachers see fit. Tsukyu are resource rooms that students with milder problems use part-time for specialized instruction individually in small groups. These students spend the rest of the day in the mainstream classroom. Some students with special needs are fully included in the mainstream classroom, with accommodations or modifications as needed.

Training of disabled students, particularly at the upper-secondary level, emphasizes vocational education to enable students to be as independent as possible within society. Vocational training varies considerably depending on the student's disability, but the options are limited for some. It is clear that the government is aware of the necessity of broadening the range of possibilities for these students. Advancement to higher education is also a goal of the government, and it struggles to have institutions of higher learning accept more disabled students.

www.numerons.in

Singapore

Special education is regulated centrally by the Singapore Ministry of Education. Both special schools and integration into mainstream schools are options for students with special educational needs, but most students with disabilities are placed in special schools.

Students with special education who wish accommodations on national exams must provide appropriate documentation to prove that they are disabled. Accommodations, but not modifications (e.g., simpler questions) are normally approved if they are similar to the accommodations already being used in everyday schoolwork, with the goal of maintaining the exam's integrity while not having students unfairly disadvantaged by factors that are unrelated to what is being tested. The accommodations are listed on the Primary School Leaving Exam.

www.numerons.in

Australia

Australian Association of Special Education Inc (AASE)‘s position is informed by the Disability Standards for Education 2005 which require that students with disabilities are treated on the same basis as other students in regards to enrolment and participation in education.

With respect to standardized tests, special consideration procedures are in place in all states for students who are disabled. Students must provide documentation Not all desired forms of accommodations are available. For example, students who cannot read, even if the inability to read is due to a disability, cannot have the exam read to them, because the exam results should accurately show that the student is unable to read. Reports on matriculation exams do not mention whether the student received any accommodations in taking the test.

www.numerons.in

Europe

Each country in Europe has its own special education support structures.

Czech Repulic

Schools must take students' special education needs into account when assessing their achievements.

Denmark

www.numerons.in

In Denmark, 99% of students with specific learning difficulties like dyslexia are educated alongside students without any learning challenges.

Finland

Schools adapt the national guidelines to the needs of individiual students. Students with special educational needs are given an individualized plan.

They may be exempted from some parts of school examinations, such as students with hearing impairments not taking listening comprehension tests. If the student receives modifications to the school-leaving exams, this is noted on the certificate of achievement. If they are not following the national core curriculum, then they are tested according to the goals of their individual educational program.

France

www.numerons.in

French students with disabilities are normally included in their neighborhood school, although children may be placed in special schools if their personalized plan calls for it. Each student's personalized school plan describes teaching methods, psychological, medical and paramedical services that the school will provide to the student.

Germany

A special school for children with special emotional needs in Kötitz, Germany

Most students with special needs in Germany attend a special school that serves only children with special needs. These include:

- Förderschule für Lernbehinderte (special school for learning disabilities): for children who have challenges that impair learning
- Schule mit dem Förderschwerpunkt Geistige Entwicklung (school for cognitive development): for children with very severe learning challenges
- Förderschule Schwerpunkt emotionale und soziale Entwicklung (school for emotional and social development): for children who have special emotional needs
- Förderschule für Blinde (school for the blind): for blind children
- Förderschule für Sehbehinderte (school for the visually impaired): for children who are visually challenged

www.numerons.in

- Förderschule für Gehörlose (school for the deaf): for deaf children
- Förderschule für Schwerhörige (school for the hearing impaired): for children who are hearing impaired
- Förderschule für Körperbehinderte (school for children with physical disabilities): for children with physical disabilities
- Förderschule für Sprachbehinderte (school for children with language disorders): for children with language disorders
- Förderschule für Taubblinde (school for the deafblind): for children who are deafblind
- Schule für Kranke (school for ill children): for children who are too ill to attend school or are hospitalized for a longer
- Förderschule für schwer mehrfach Behinderte (school for children with severe and multiple disabilities): for children with severe and multiple disabilities who needn very special care and attention. Sometimes these children are only susceptible for very basic emotional and sensory stimulation. Thus teachers at these school (as well as at schools for the deafblind) are highly specialized professionals.

www.numerons.in

One in 21 German students attends a special school. Teachers at those schools are specially trained professionals who have specialized in special needs education while in college. Special schools often have a very favorable student-teacher ratio and facilities other schools do not have.

Some special needs children in Germany do not attend a special school, but are educated in a mainstream school such as a Hauptschule or Gesamtschule (comprehensive school).

www.numerons.in

Students with special educational needs may be exempted from standardized tests or given modified tests.

Greece

Greek students with special needs may attend either mainstream schools or special schools.

Students whose disabilities have been certified may be exempted from some standardized tests or given alternative tests. Accommodations are responsive to students' needs; for example, students with visual impairments may take oral tests, and students with hearing impairments take written tests. Accommodations and modifications are noted on the certificate of achievement.

Hungary

www.numerons.in

Special education is regulated centrally.

According to the 1993 Act on Public Education, students with special educational needs may be exempted from standardized tests or given modified tests. They have a right to

extra time, a choice of formats for the tests (e.g., oral rather than written), and any equipment that they normally use during the school day.

As of 2006, students with disabilities received a significant bonus (eight points) on the university entrance examination, which has been criticized as unfair.

The Netherlands

www.numerons.in

As a general rule, students with special educational needs are integrated into their regular, mainstream schools with appropriate support, under the "Going to School Together" policy (Weer Samen Naar School). Four types of disability-specific special schools exist. The national policy is moving towards "suitable education" (passend onderwijs), based on the individual's strengths and weakensses.

A strong emphasis is placed on the specific needs and positive capabilities of the individual, rather than on limitations. Disabilities are normally documented by experts.

Norway

The National Support System for Special Needs Education (Statped) is managed by the Norwegian Directorate for Education and Training. The general objective for Statped is to give guidance and support to those in charge of the education in municipalities and county administrations to ensure that children, young people and adults with major and special educational needs are secured well-advised educational and developmental provisions. The institutions affiliated with Statped offer a broad spectrum of services. Statped consists of 13 resource centres owned by the State, and 4 units for special education, where Statped buys services. These centres offer special educational guidance and support for local authorities and county administrations.

www.numerons.in

Portugal

Students with disabilities have a "guaranteed right" to appropriate accommodations on assessments. Schools are generally considered autonomous.

Slovenia

On national tests, the National Examination Center normally grants most requests for accommodations that are supported by the local school's examination committee. Legislation opposes the use of modifications that would be unfair to non-disabled students.

Spain

www.numerons.in

Schools are required to provide services and resources to students with special educational needs so that they make progress and participate in school. If the local school is unable to provide appropriately for an individual student, then the student may be transferred to a special school.

Spanish non-governmental organizations like ONCE have traditionally provided significant services to students with disabilities.

Sweden

Local schools have significant autonomy. Schools are expected to help students meet the goals that are set for them.

www.numerons.in

Switzerland

Education is controlled by the 26 cantons, and so special education programs vary from place to place. However, integration is typical. Students are assessed according to their individual learning goals.

United Kingdom

In England and Wales the acronym SEN for Special Educational Needs denotes the condition of having special educational needs, the services which provide the support and the programmes and staff which implement the education. In England SEN PPS refers to the Special Educational Needs Parent Partnership Service. SENAS is the special educational needs assessment service, which is part of the Local Authority. SENCO refers to a special educational needs coordinator, who usually works with schools and the children within schools who have special educational needs. The Special Educational Needs Parent Partnership Services help parents with the planning and delivery of their child's educational provision. The Department for Education oversees special education in England.

www.numerons.in

Most students have an individual educational plan, but students may have a group plan in addition to, or instead of, an individual plan. Groups plans are used when a group of students all have similar goals.

In Scotland the Additional Support Needs Act places an obligation on education authorities to meet the needs of all students in consultation with other agencies and parents. In Scotland the term Special Educational Needs (SEN), and its variants are not official terminology although the very recent implementation of the Additional Support for Learning Act means that both SEN and ASN (Additional Support Needs) are used interchangeably in current common practice.

North America

www.numerons.in

In North America, special education is commonly abbreviated as special ed, SpecEd, SPED, or SpEd in a professional context.

Canada

Education in Canada is the responsibility of the individual provinces and territories. As such, rules vary somewhat from place to place. However, inclusion is the dominant model.

For major exams, Canadian schools commonly use accommodations, such as specially printed examinations for students with visual impairments, when assessing the achievements of students with special needs. In other instances, alternative assessments or modifications that simplify tests are permitted, or students with disabilities may be exempted from the tests entirely.

www.numerons.in

United States

All special-needs students receive an Individualized Education Program (IEP) that outlines how the school will meet the student's individual needs. The Individuals with Disabilities Education Act (IDEA) requires that students with special needs be provided with a Free Appropriate Public Education in the Least Restrictive Environment that is appropriate to the student's needs. Government-run schools provide special education in varying degrees from the least restrictive settings, such as full inclusion, to the most restrictive settings, such as segregation in a special school. The education offered by the school must be appropriate to the student's individual needs. Schools are not required to maximize the student's potential or to provide the best possible services. Unlike most of the developed world, American schools are also required to provide many medical services, such as speech therapy, if the student needs these services.

According to the Department of Education, approximately 6 million children (roughly 10 percent of all school-aged children) currently receive some type of special education services. As with most countries in the world, students who are poor, ethnic minorities, or do not speak the dominant language fluently are disproportionately identified as needing special education services. Poor, black and Latino urban schools are more likely to have limited resources and to employ inexperienced teachers that do not cope well with student behavior problems, "thereby increasing the number of students they referred to special education."

www.numerons.in

During the 1960s, in some part due to the civil rights movement, some researchers began to study the disparity of education amongst people with disabilities. The landmark Brown v. Board of Education decision, which declared unconstitutional the "separate but equal" arrangements in public schools for students of different races, paved the way for PARC v. Commonwealth of Pennsylvania and Mills vs. Board of Education of District of Columbia, which challenged the segregation of students with special needs. Courts ruled that unnecessary and inappropriate segregation of students with disabilities was unconstitutional. Congress responded to these court rulings with the federal Education for All Handicapped Children Act in 1975 (since renamed the Individuals with Disabilities Education Act (IDEA)). This law required schools to provide services to students previously denied access to an appropriate education.

www.numerons.in

In US government-run schools, the dominant model is inclusion. In the United States, three out of five students with academic learning challenges spend the overwhelming majority of their time in the regular classroom.

Alternative therapies for developmental and learning disabilities

www.numerons.in

Alternative therapies for developmental and learning disabilities include a range of practices used in the treatment of dyslexia, ADHD, Asperger syndrome, autism, Down syndrome and other developmental and learning disabilities. Treatments include changes in diet, dietary supplements, biofeedback, chelation therapy, homeopathy, massage and yoga. These therapies generally rely on theories that have little scientific basis, lacking well-controlled, large, randomized trials to demonstrate safety and efficacy; small trials that have reported beneficial effects can be generally explained by the ordinary waxing and waning of the underlying conditions.

Treatment needs

There are a number of non-standard treatments for developmental and learning disabilities. There is a call for alternative therapies particularly when a condition lacks a reliable remediation. For example, there is no cure for autism; the main goals of mainstream behavioral and medical management are to lessen associated deficits and family distress, and to increase quality of life and functional independence. Some alternative therapies, such as gluten-free, casein-free diets, may be appealing to some parents because the treatment recommended by most experts is thought to be "cold and manipulative". Parents may also consider a drug treatment for attention deficit as avoidable. Alternative treatments to a stimulant medication range from natural products to psychotherapeutic techniques and highly technological interventions. It has been argued that although texts that promote alternative therapies do not directly accuse parents of inadequacy, the claims that the disability is caused by certain factors, such as poor nutrition, supports the culture of mother-blame.

www.numerons.in

Prevalence

From 12% to 64% of families of a child with ADHD use an alternative therapy, with the lower estimates likely come from narrower definitions of complementary and alternative medicine (CAM). School teachers, family and friends are the most common source of suggestion of alternative therapies for ADHD. In 2003, 64 percent of families of a child with special health care needs reported that they use alternative therapies. These therapies included spiritual healing, massage, chiropractic, herbs and special diets, homeopathy, self hypnosis and other methods of complementary and alternative medicine. The need for an alternative therapy was related to the child's condition and to its evaluation as repairable or not. A 2008 study found that about 40% of Hong Kong children with autism spectrum disorder were treated with CAM, with the most popular therapies being acupuncture, sensory integration therapy, and Chinese herbology; the 40% is a lower prevalence than in

www.numerons.in

Canada and the U.S., where biological-based therapies such as special diets predominate. In the U.S. CAM is used by an estimated 20–40% of healthy children, 30–70% of children with special health care needs, and 52–95% of children with autism, and a 2009 survey of U.S. primary care physicians found that more of them recommended than discouraged multivitamins, essential fatty acids, melatonin, and probiotics as CAM treatments for autism.

Evidence basis

www.numerons.in

Complementary and alternative medicine often lacks support in scientific evidence, so its safety and efficacy are often questionable. Some therapists who advocate CAM may claim to cure many conditions or disabilities that are not diseases and therefore cannot be "cured".

While some experts encourage parents to be open-minded, others argue that treatments and services with no proven efficacy have opportunity costs because they displace the opportunity to participate in efficient treatments and services. According to Scott O. Lilienfeld,

> many individuals who spend large amounts of time and money on ineffective treatments may be left with precious little of either. As a result, they may forfeit the opportunity to obtain treatments that could be more helpful. Thus, even ineffective treatments that are by themselves innocuous can indirectly produce negative consequences.

There is often little or no scientific evidence for effectiveness of alternative therapies. It may be difficult to separate the success of a specific treatment from natural development or from the benefits of the individual's positive attitude. Some phenomena to be considered when evaluating studies are the placebo effect, the Hawthorne effect and different types of attentional and motivational effects. Doubtless, people with disabilities may benefit from some alternative therapies, at least for relaxation, social interaction, personal development and self-esteem. This can be important because many children with learning difficulties suffer from low self-esteem.

For instance, a randomised controlled trial with dyslexic children was undertaken to evaluate the efficiency of Sunflower therapy which includes applied kinesiology, physical manipulation, massage, homeopathy, herbal remedies and neuro-linguistic programming. There were no significant improvements in cognitive nor literacy test performance associated with the treatment, but there were significant improvements in self-esteem for the treatment group. This study did not control for the placebo effect.

Precautions

www.numerons.in

Because many alternative therapies have not been evaluated in scientific studies there may be no guarantee for their safety. In most countries, with the exception of osteopathy and chiropractic, complementary medical disciplines have not been state registered. This means there is no law to forbid anyone from setting up as a practitioner even with no qualification nor experience. There are also a lot of 'universities' offering all kinds of

alternative medicine degrees for a fee, and their certificates can look very real. These organisations may, on the other hand, offer ongoing training and an insurance to their registered members.

Experts of alternative therapies advise customers to be careful when choosing a therapist. Before taking a therapy, it is wise to find out whether or not previous customers recommend it, the therapist has a qualification and is a registered practitioner, whether the therapy could be dangerous, how much the treatment costs, and whether money will be refunded if the therapy does not work.

www.numerons.in

Learning Disability Coalition

The Learning Disability Coalition is a group of fourteen organisations which campaigns to secure better funding for social care for people with learning disabilities in England.

The Coalition was formed in May 2007. It believes that better funding from the UK Government is required to help people with learning disabilities to secure a full range of rights and opportunities. The LDC aims to provide a unified voice for people with learning disabilities to government and other key decision makers; to raise awareness of financial pressures on services, and achieve an evidence-based assessment of the long-term resource requirements for people with learning disabilities

Its members are:

www.numerons.in

- The Foundation for People with Learning Disabilities
- Mencap
- People First
- National Forum for People with Learning Difficulties
- Sense
- Turning Point
- Down's Syndrome Association
- United Response
- BILD (British Institute of Learning Disabilities)
- ARC Association for Real Change
- National Autistic Society
- Real Life Options
- National Family Carer Network
- Voyage

Protect the Frontline

www.numerons.in

In 2010 the LDC launched its 'Protect the Frontline' campaign which is calling on politicians to keep to their promises and protect frontline services for people with a learning disability. As part of the campaign, the LDC produced 'Stories from the Frontline' , which included a series of diaries by people with a learning disability. These diaries helped to

show the importance of frontline social care and the difference that it makes to their lives and the lives of their families. The LDC has been monitoring cuts to social care through its cutswatch feature , and since the announcement of the Comprehensive Spending Review , has been calling on local councillors to ensure that social care spending is protected at a local level.

Management

www.numerons.in

The Coalition's Director is Anthea Sully and its Co-Chairs are Andrew Lee, Director of People First and Mark Goldring, Chief Executive of Mencap.

Personal development

Personal development includes activities that improve awareness and identity, develop talents and potential, build human capital and facilitates employability, enhance quality of life and contribute to the realization of dreams and aspirations. The concept is not limited to self-help but includes formal and informal activities for developing others, in roles such as teacher, guide, counselor, manager, coach, or mentor. Finally, as personal development takes place in the context of institutions, it refers to the methods, programs, tools, techniques, and assessment systems that support human development at the individual level in organizations.

At the level of the individual, personal development includes the following activities:

www.numerons.in

- improving self-awareness
- improving self-knowledge
- building or renewing identity
- developing strengths or talents
- improving wealth
- spiritual development
- identifying or improving potential
- building employability or human capital
- enhancing lifestyle or the quality of life
- improving health
- fulfilling aspirations
- initiating a life enterprise or personal autonomy
- defining and executing personal development plans
- improving social abilities

The concept covers a wider field than self-development or self-help: personal development also includes developing others. This may take place through roles such as those of a teacher or mentor, either through a personal competency (such as the skill of certain managers in developing the potential of employees) or a professional service (such as providing training, assessment or coaching).

www.numerons.in

Beyond improving oneself and developing others, personal development is a field of practice and research. As a field of practice it includes personal development methods, learning programs, assessment systems, tools and techniques. As a field of research, personal development topics increasingly appear in scientific journals, higher education reviews, management journals and business books.

Any sort of development — whether economic, political, biological, organizational or personal — requires a framework if one wishes to know whether change has actually occurred. In the case of personal development, an individual often functions as the primary judge of improvement, but validation of objective improvement requires assessment using standard criteria. Personal development frameworks may include goals or benchmarks that define the end-points, strategies or plans for reaching goals, measurement and assessment of progress, levels or stages that define milestones along a development path, and a feedback system to provide information on changes.

www.numerons.in

The "Personal Development Industry"

Personal development as an industry has several formats of operating. The main ways are business-to-consumer and business-to-business, however there are two newer ways increasing in their prevalence. They are consumer-to-business and consumer-to-consumer.

The Business-to-Consumer Market

The business-to-consumer market involves selling books, courses and techniques to individuals, such as:

www.numerons.in

- newly-invented offerings such as:
  - fitness
  - beauty enhancement
  - weight loss
- traditional practices such as:
  - yoga
  - martial arts
  - meditation

Some programs are delivered online and many include tools sold with a program, such as motivational books for self-help, recipes for weight-loss or technical manuals for yoga and martial-arts programs.

A partial list of personal development offerings on the business-to-individual market might include:

www.numerons.in

- books
- motivational speaking
- e-Learning programs
- workshops
- individual counseling

- life coaching

The Business-to-Business Market

The business-to-business market also involves programs - in this case ones sold to companies and to governments to assess potential, to improve effectiveness, to manage work-life balance or to prepare some entity for a new role in an organization. The goals of these programs are defined with the institution or by the institution and the results are assessed. With the acceptance of personal development as a legitimate field in higher education, universities and business schools also contract programs to external specialist firms or to individuals.

A partial list of business-to-business programs might include:

courses and assessment systems for higher education organizations for their students
management services to employees in organizations through:

- training
- training and development programs
- personal-development tools
- self-assessment
- feedback
- coaching
- mentoring

www.numerons.in

Some consulting firms specialize in personal development but as of 2009 generalist firms operating in the fields of human resources, recruitment and organizational strategy have entered what they perceive as a growing market, not to mention smaller firms and self-employed professionals who provide consulting, training and coaching.

Origins

Major religions, such as the Abrahamic and Indian religions, as well as New Age philosophies, have used practices such as prayer, music, dance, singing, chanting, poetry, writing, sports and martial arts. These practices have various functions, such as health or aesthetic satisfaction, but they may also link to "final goals" of personal development such as discovering the meaning of life or living good life (compare philosophy).

Michel Foucault describes in Care of the Self the techniques of epimelia used in ancient Greece and Rome, which included dieting, exercise, sexual abstinence, contemplation, prayer and confession — some of which also became important practices within different branches of Christianity. In yoga, a discipline originating in India, possibly over 3000 years ago, personal-development techniques include meditation, rhythmic breathing, stretching and postures. Wu Shu and Tai Qi Quan utilise traditional Chinese techniques, including breathing and energy exercises, meditation, martial arts, as well as practices linked to traditional Chinese medicine, such as dieting, massage and acupuncture. In Islam, which

arose almost 1500 years ago in the Middle East, personal development techniques include ritual prayer, recitation of the Qur'an, pilgrimage, fasting and tazkiyah (purification of the soul).

Two individual ancient philosophers stand out as major sources of what has become personal development in the 21st century, representing a Western tradition and an East Asian tradition. Elsewhere anonymous founders of schools of self-development appear endemic - note the traditions of the Indian sub-continent in this regard.

www.numerons.in

South Asian traditions

Some ancient Indians aspired to "beingness, wisdom and happiness".

Aristotle and the Western tradition

The Greek philosopher Aristotle (384 BC – 322 BC) influenced theories of personal development in the West. In his Nicomachean Ethics, Aristotle defined personal development as a category of phronesis or practical wisdom, where the practice of virtues (arête) leads to eudaimonia, commonly translated as "happiness" but more accurately understood as “human flourishing” or “living well". Aristotle continues to influence the Western concept of personal development to this day, particularly in the economics of human development and in positive psychology.

Confucius and the East Asian tradition

www.numerons.in

In Chinese tradition, Confucius (around 551 BC – 479 BC) founded an ongoing philosophy. His ideas continue to influence family values, education and management in China and East Asia. In his Great Learning Confucius wrote:

The ancients who wished to illustrate illustrious virtue throughout the kingdom, first ordered well their own states. Wishing to order well their states, they first regulated their families. Wishing to regulate their families, they first cultivated their persons. Wishing to cultivate their persons, they first rectified their hearts. Wishing to rectify their hearts, they first sought to be sincere in their thoughts. Wishing to be sincere in their thoughts, they first extended to the utmost their knowledge. Such extension of knowledge lay in the investigation of things.

Contexts

Personal development in psychology

www.numerons.in

Psychology became linked to personal development, not with the psychoanalysis of Freud (1856–1939) but starting with his contemporaries Alfred Adler (1870–1937) and Carl Jung (1875–1961).

Adler refused to limit psychology to analysis, making the important point that aspirations look forward and do not limit themselves to unconscious drives or to childhood experiences. He also originated the concepts of lifestyle (1929 — he defined "lifestyle" as an individual's characteristic approach to life, in facing problems) and of self image, a concept that influenced management under the heading of work-life balance.

Carl Gustav Jung made contributions to personal development with his concept of individuation, which he saw as the drive of the individual to achieve the wholeness and balance of the Self.

www.numerons.in

Daniel Levinson (1920–1994) developed Jung's early concept of "life stages" and included a sociological perspective. Levinson proposed that personal development come under the influence — throughout life — of aspirations, which he called "the Dream":

Whatever the nature of his Dream, a young man has the developmental task of giving it greater definition and finding ways to live it out. It makes a great difference in his growth whether his initial life structure is consonant with and infused by the Dream, or opposed to it. If the Dream remains unconnected to his life it may simply die, and with it his sense of aliveness and purpose.

Levinson's model of seven life-stages has been considerably modified due to sociological changes in the lifecycle.

Research on success in reaching goals, as undertaken by Albert Bandura (born 1925), suggested that self-efficacy best explains why people with the same level of knowledge and skills get very different results. According to Bandura self-confidence functions as a powerful predictor of success because:

www.numerons.in

- it makes you expect to succeed
- it allows you take risks and set challenging goals
- it helps you keep trying if at first you don't succeed
- it helps you control emotions and fears when the going gets rough

In 1998 Martin Seligman won election to a one-year term as President of the American Psychological Association and proposed a new focus: on healthy individuals rather than on pathology:

We have discovered that there is a set of human strengths that are the most likely buffers against mental illness: courage, optimism, interpersonal skill, work ethic, hope, honesty and perseverance. Much of the task of prevention will be to create a science of human strength whose mission will be to foster these virtues in young people.

www.numerons.in

Personal development in higher education

Personal development has been at the heart of education in the West in the form of the Greek philosophers; and in the East with Confucius. Some people emphasize personal

development as a part of higher education. Wilhelm von Humboldt, who founded the University of Berlin (since 1949: Humboldt University of Berlin) in 1810, made a statement interpretable as referring to personal development: ... if there is one thing more than another which absolutely requires free activity on the part of the individual, it is precisely education, whose object it is to develop the individual.

During the 1960s a large increase in the number of students on American campuses led to research on the personal development needs of undergraduate students. Arthur Chickering defined seven vectors of personal development for young adults during their undergraduate years:

www.numerons.in

- developing competence
- managing emotions
- achieving autonomy and interdependence
- developing mature interpersonal relationships
- establishing identity
- developing purpose
- developing integrity

In the UK, personal development took a central place in university policy in 1997 when the Dearing Report declared that universities should go beyond academic teaching to provide students with personal development. In 2001 a Quality Assessment Agency for UK universities produced guidelines for universities to enhance personal development as:

www.numerons.in

- a structured and supported process undertaken by an individual to reflect upon their own learning, performance and / or achievement and to plan for their personal, educational and career development;
- objectives related explicitly to student development; to improve the capacity of students to understand what and how they are learning, and to review, plan and take responsibility for their own learning

In the 1990s, business schools began to set up specific personal-development programs for leadership and career orientation and in 1998 the European Foundation for Management Development set up the Equis accreditation system which specified that personal development must form part of the learning process through internships, working on team projects and going abroad for work or exchange programs.

The first personal development certification required for business school graduation originated in 2002 as a partnership between Metizo, a personal-development consulting firm, and the Euromed Management School in Marseilles: students must not only complete assignments but also demonstrate self-awareness and achievement of personal-development competencies.

www.numerons.in

As an academic department personal development has become a specific discipline, usually associated with business schools. As an area of research, personal development draws on links to other academic disciplines:

- education for questions of learning and assessment
- psychology for motivation and personality
- sociology for identity and social networks
- economics for human capital and economic value
- philosophy for ethics and self-reflection

Personal development in the workplace

www.numerons.in

Abraham Maslow (1908–1970), proposed a hierarchy of needs with self actualization at the top, defined as:

… the desire to become more and more what one is, to become everything that one is capable of becoming.

Since Maslow himself believed that only a small minority of people self-actualize — he estimated one percent — his hierarchy of needs had the consequence that organizations came to regard self-actualization or personal development as occurring at the top of the organizational pyramid, while job security and good working conditions would fulfill the needs of the mass of employees.

As organizations and labor markets became more global, responsibility for development shifted from the company to the individual. In 1999 management thinker Peter Drucker wrote in the Harvard Business Review:

www.numerons.in

We live in an age of unprecedented opportunity: if you've got ambition and smarts, you can rise to the top of your chosen profession, regardless of where you started out. But with opportunity comes responsibility. Companies today aren't managing their employees' careers; knowledge workers must, effectively, be their own chief executive officers. It's up to you to carve out your place, to know when to change course, and to keep yourself engaged and productive during a work life that may span some 50 years.

Management professors Sumantra Ghoshal of the London Business School and Christopher Bartlett of the Harvard Business School wrote in 1997 that companies must manage people individually and establish a new work contract. On the one hand the company must allegedly recognize that personal development creates economic value: "market performance flows not from the omnipotent wisdom of top managers but from the initiative, creativity and skills of all employees".

On the other hand, employees should recognize that their work includes personal development and "... embrace the invigorating force of continuous learning and personal development".

www.numerons.in

The 1997 publication of Ghoshal's and Bartlett's Individualized Corporation corresponded to a change in career development from a system of predefined paths defined by companies, to a strategy defined by the individual and matched to the needs of

organizations in an open landscape of possibilities. Another contribution to the study of career development came with the recognition that women's careers show specific personal needs and different development paths from men. The 2007 study of women's careers by Sylvia Ann Hewlett Off-Ramps and On-Ramps had a major impact on the way companies view careers. Further work on the career as a personal development process came from study by Herminia Ibarra in her Working Identity on the relationship with career change and identity change, indicating that priorities of work and lifestyle continually develop through life.

www.numerons.in

Personal development programs in companies fall into two categories: the provision of employee benefits and the fostering of development strategies.

Employee benefits have the purpose of improving satisfaction, motivation and loyalty. Employee surveys may help organizations find out personal-development needs, preferences and problems, and they use the results to design benefits programs. Typical programs in this category include:

- work-life balance
- time management
- stress management
- health programs
- counseling

Many such programs resemble programs that some employees might conceivably pay for themselves outside work: yoga, sports, martial arts, money-management, positive psychology, NLP, etc.

www.numerons.in

As an investment, personal development programs have the goal of increasing human capital or improving productivity, innovation or quality. Proponents actually see such programs not as a cost but as an investment with results linked to an organization's strategic development goals. Employees gain access to these investment-oriented programs by selection according to the value and future potential of the employee, usually defined in a talent management architecture including populations such as new hires, perceived high-potential employees, perceived key employees, sales staff, research staff and perceived future leaders. Organizations may also offer other (non-investment-oriented) programs to many or even all employees. Typical programs focus on career-development, personal effectiveness, teamwork, and competency-development. Personal development also forms an element in management tools such as personal development planning, assessing one's level of ability using a competency grid, or getting feedback from a 360 questionnaire filled in by colleagues at different levels in the organization.

www.numerons.in

Positive Disintegration

The Theory of Positive Disintegration (TPD) by Kazimierz Dąbrowski describes a theory of personality development.

Unlike mainstream psychology, Dąbrowski's theoretical framework views psychological tension and anxiety as necessary for growth. These "disintegrative" processes are therefore seen as "positive," whereas people who fail to go through positive disintegration may remain for their entire lives in a state of "primary integration." Advancing into disintegration and into the higher levels of development is predicated on having developmental potential, including overexcitabilities, above-average reactions to stimuli.

www.numerons.in

Unlike some other theories of development such as Erikson's stages of psychosocial development, it is not assumed that even a majority of people progress through all levels. TPD is not a theory of stages, and levels do not correlate with age.

Dąbrowski's theory

Kazimierz Dąbrowski (1902–1980), a Polish psychiatrist and psychologist, developed the Theory of Positive Disintegration over his lifetime of clinical and academic work. The Theory of Positive Disintegration is a novel approach to personality development.

Dąbrowski's theory of personality development emphasized several major features including:

- personality is not a given universal trait, it must be created—shaped—by the individual to reflect his or her own unique character (personality shaping)
- personality develops as a result of the action of developmental potential (DP) (overexcitability and the autonomous factor), not everyone displays sufficient DP to create a unique personality.
- developmental potential is represented in the population by a normal (bell) curve. Dąbrowski used a multilevel approach to describe the continuum of developmental levels seen in the population.
- developmental potential creates crises characterized by strong anxieties and depressions—psychoneurosis—that precipitate disintegration
- for personality to develop, initial integrations based on instinct and socialization must disintegrate—a process Dąbrowski called positive disintegration
- the development of a hierarchy of individual values—emotional reactions—are a critical component in developing one's personality and one's autonomy, thus, in contrast to most psychological theories, emotions play a major role in this approach
- emotional reactions guide the individual in creating his or her individual personality ideal, an autonomous standard that acts as the goal of individual development

www.numerons.in

www.numerons.in

- the individual must examine his or her essence and subsequently make existential choices that emphasize those aspects of essence that are higher and "more myself" and inhibit those aspects that are lower or "less myself" based upon his or her own personality ideal

- critical components of individual development include autoeducation and autopsychotherapy

www.numerons.in

Factors in development

Dąbrowski observed that most people live their lives in a state of "primary or primitive integration" largely guided by biological impulses ("first factor") and/or by uncritical endorsement and adherence to social convention ("second factor"). He called this initial integration Level I. Dąbrowski observed that at this level there is no true individual expression of the autonomous human self. Individual expression at Level I is influenced and constrained by the first two factors.

The first factor channels energy and talents toward accomplishing self-serving goals that reflect the lower instincts and biological ego — its primary focus is on survival and self-advancement. Often talents are used in antisocial or asocial ways. For example, at the lowest edge of Level I many criminals display this type of selfish behavior. They advance their own goals at the expense of others.

The second factor, the social environment (milieu) and peer pressure, constrains individual expression and creativity by encouraging a group view of life and discouraging unique thought and expression. The second factor externalizes values and mores, thereby externalizing conscience. Social forces shape expectations. Behavior and one's talents and creativity are funneled into forms that follow and support the existing social milieu. "My mom says we should always be aware of what our lawn looks like because we want other people to think well of us when they drive by." Because conscience is derived from an external social context, so long as society holds ethical standards people influenced by second factor will behave ethically. However if a society, church, or government becomes corrupt, as in Nazi Germany, people strongly influenced by second factor will not dissent. Socialization without individual examination leads to a rote and robotic existence (the "robopath" described by Ludwig von Bertalanffy). Individual reactions are not unique, they are based upon social contexts ("I cry at funerals and laugh at weddings — everyone does"). According to Dąbrowski, people primarily motivated by second factor represent a significant majority of the general population.

Dąbrowski felt that our society was largely influenced by these lower two factors and could be characterized as operating at Level I. For example, our emphasis on corporate success ("a dog eat dog mentality") means that many CEOs operate on the basis of first factor — they will quickly sacrifice another to enhance their own advancement. As well, our educational, political, corporate, and media systems are self promoting and discourage real examination or individual autonomy — the second factor. Alternatively, social justifications are often used: "of course I break the speed limit, everyone does." Or a soldier may explain

that he or she was simply "following orders." Thus, this external value system absolves the individual of any individual responsibility.

Dąbrowski also described a group of people who display a different course: an individualized developmental pathway. These people break away from an automatic, rote, socialized view of life (which Dąbrowski called negative adjustment) and move into and through a series of personal disintegrations. Dąbrowski saw these disintegrations as a key element in the overall developmental process. Crises challenge our status quo and cause us to review our self, ideas, values, thoughts, ideals, etc. If development continues, one goes on to develop an individualized, conscious and critically evaluated hierarchical value structure (called positive adjustment). This hierarchy of values acts as a benchmark by which all things are now seen, and the higher values in our internal hierarchy come to direct our behavior (no longer based on external social mores). These higher, individual values characterize an eventual second integration reflecting individual autonomy and for Dąbrowski, mark the arrival of true human personality. At this level, each person develops his or her own vision of how life ought to be and lives it. This higher level is associated with strong individual approaches to problem solving and creativity. One's talents and creativity are applied in the service of these higher individual values and visions of how life could be - how the world ought to be. The person expresses his or her "new" autonomous personality energetically through action, art, social change and so on.

www.numerons.in

Development potential

Advanced development is often seen in people who exhibit strong developmental potential ("DP"). Developmental potential represents a constellation of genetic features, expressed and mediated through environmental interaction. Many factors are incorporated in developmental potential but three major aspects are highlighted: overexcitability (OE), specific abilities and talents, and a strong drive toward autonomous growth, a feature Dąbrowski called the "third factor."

www.numerons.in

Overexcitability

The most evident aspect of developmental potential is overexcitability (OE), a heightened physiological experience of stimuli resulting from increased neuronal sensitivities. The greater the OE, the more intense are the day-to-day experiences of life. Dąbrowski outlined five forms of OE: psychomotor, sensual, imaginational, intellectual and emotional. These overexcitabilities, especially the latter three, often cause a person to experience daily life more intensely and to feel the extremes of the joys and sorrows of life profoundly. Dąbrowski studied human exemplars and found that heightened overexcitability was a key part of their developmental and life experience. These people are steered and driven by their value "rudder", their sense of emotional OE. Combined with imaginational and intellectual OE, these people have a powerful perception of the world.

www.numerons.in

Although based in the nervous system, overexcitabilities come to be expressed psychologically through the development of structures that reflect the emerging autonomous self. The most important of these conceptualizations are dynamisms:

biological or mental forces that control behavior and its development. Instincts, drives and intellectual processes combined with emotions are dynamisms. With advanced development, dynamisms increasingly reflect movement toward autonomy.

Abilities and talents

The second arm of developmental potential, specific abilities and talents, tends to serve the person's developmental level. As outlined, people at lower levels use talents to support egocentric goals or to climb the social and corporate ladders. At higher levels, specific talents and abilities become an important force as they are channeled by the person's value hierarchy into expressing and achieving the person's vision of his or her ideal personality and his or her view of how the world ought to be.

www.numerons.in

The third factor

The third aspect of developmental potential, which is simply referred to as 'the third factor', is a drive toward individual growth and autonomy. The third factor is critical as it applies one's talents and creativity toward autonomous expression, and second, it provides motivation to strive for more and to try to imagine and achieve goals currently beyond one's grasp. Dąbrowski was clear to differentiate third factor from free will. He felt that free will did not go far enough in capturing the motivating aspects that he attributed to third factor. For example, an individual can exercise free will and show little motivation to grow or change as an individual. Third factor specifically describes a motivation—a motivation to become one's self. This motivation is often so strong that in some situations we can observe that one needs to develop oneself and that in so doing, it places one at great peril. This feeling of "I've gotta be me" especially when it is "at any cost" and especially when it is expressed as a strong motivator for self-growth is beyond the usual conceptualization ascribed to free will.

www.numerons.in

A person whose DP is high enough will generally undergo disintegration, despite any external social or family efforts to prevent it. A person whose DP is low will generally not undergo disintegration (or positive personality growth) even in a conducive environment.

The notion that some people have an innate potential for development that is determined by a higher sensitivity or overexcitability (analogous to the first aspect of DP) and by a related tendency to develop individual differences and autonomy from the group (analogous to the third aspect of DP) was independently developed by Elaine Aron (see Highly sensitive person). (although it should be noted that Aron's approach is substantially different than Dąbrowski's.)

A mixed blessing?

www.numerons.in

Dąbrowski called OE "a tragic gift" to reflect that the road of the person with strong OE is not a smooth or easy one. Potentials to experience great highs are also potentials to experience great lows. Similarly, potentials to express great creativity hold the likelihood of experiencing a great deal of personal conflict and stress. This stress both drives

development and is a result of developmental conflicts, both intrapsychic and social. Suicide is a significant risk in the acute phases of this stress. The isolation often experienced by these people heightens the risk of self-harm.

Dąbrowski advocated autopsychotherapy, educating the person about OEs and the disintegrative process to give him or her a context within which to understand intense feelings and needs. Dąbrowski suggested giving people support in their efforts to develop and find their own self-expression. Children and adults with high DP have to find and walk their own path, often at the expense of fitting in with their social peers and even with their families. At the core of autopsychotherapy is the awareness that no one can show anyone else the "right" path. Everyone has to find their own path for themselves. As Joseph Campbell described the knights on the Grail Quest: If a path exists in the forest, don't follow it, for though it took someone else to the Grail, it will not take you there, because it is not your path.

www.numerons.in

The levels

The first and fifth levels are characterized by psychological integration, harmony, and little inner conflict. There is little internal conflict at Level I because just about every behavior is justified — it is either good for the individual and is therefore "right," or the individual's society endorses it and it is therefore "right." In either case, with a high level of confidence the individual acts as he or she perceives anyone else would, and does what anyone is "supposed to do." At Level V there is no internal conflict because what a person does is always in accord with their own internal sense of values. Of course, there is often external conflict at both Levels I and V.

www.numerons.in

Levels II, III and IV describe various degrees and types of dis-integration and literal dis-ease.

Dąbrowski was very clear that the levels he presents "represent a heuristic device". In the process of development the structures of two or even three contiguous levels may exist side by side, although it must be understood that they exist in conflict. The conflict is resolved when one of the structures is eliminated, or at least comes under complete control of another structure.

Level I: Primary Integration

As outlined above, the first level is called primitive or primary integration. People at this level are often influenced primarily by either prominent first factor (heredity/impulse) and/or second factor (social environment) forces. The majority of people at Level I are integrated at the environmental or social level (Dąbrowski called them average people); however, many also exhibit shades of both impulse and socialization. Dąbrowski distinguished the two subgroups of Level I by degree: "the state of primary integration is a state contrary to mental health. A fairly high degree of primary integration is present in the average person; a very high degree of primary integration is present in the psychopath". Marked by selfishness and egocentrism (both reticent and explicit), those at level one

www.numerons.in

development generally seek self-fulfillment above all, justifying their pursuits through a sort of "it's all about me" thinking; or, more simply put, they adhere strongly to the phrase "the end justifies the means", sometimes disregarding the severity of the "means". Many people who are considered "leaders" often fall into this category.

A vast majority of people either do not break down their primitive integration at all, or after a relatively short period of disintegration, usually experienced at the time of adolescence and early youth, end in a reintegration at the former level or in partial integration of some of the functions at slightly higher levels, without a transformation of the whole mental structure.

www.numerons.in

Level II: Unilevel Disintegration

The character of level II is reflected in its name: unilevel disintegration. The prominent feature of this level is an initial, brief and often intense crisis or series of crises. Crises are spontaneous and only occur on one level (and often involve only one dimension). These crises involve alternatives that may appear to be different but ultimately are on the same level.

Unilevel disintegration occurs during developmental crises such as puberty or menopause, in periods of difficulty in handling some stressful external event, or under psychological and psychopathological conditions such as nervousness and psychoneurosis. Unilevel disintegration consists of processes on a single structural and emotional level; there is a prevalence of automatic dynamisms with only slight self consciousness and self-control.

www.numerons.in

Conflicts on the same level (horizontal) produce ambitendencies and ambivalences: the person is equally attracted by different but equivalent choices on the same level (ambitendencies) and is not able to decide what to do because he or she has no real preference between the choices (ambivalences). If developmental forces are strong enough, ultimately, the person is thrust into an existential crisis: one's social rationales no longer account for one's experiences and there are no alternative explanations. During this phase, existential despair is the predominant emotion. The resolution of this phase begins as individually chosen values begin to replace social mores that have been ingrained by rote and are integrated into a new hierarchy of personal values. These new values often conflict with the person's previous social values. Many of the status quo explanations for the "way things are," learned through education and from the social order, collapse under conscious, individual scrutiny. This causes more conflicts focused on the person's analysis of his or her own reactions to the world at large and of the behavior of self and others. Common behaviors and the ethics of the prevailing social order come to be seen as inadequate, wrong or hypocritical. Positive maladjustment prevails. For Dąbrowski, these crises represent a strong potential for development toward personal growth and mental health. Using a positive definition, mental health reflects more than social conformity: it involves a careful, personal examination of the world and of one's values, leading to the development of an individual personality.

www.numerons.in

Level II is a transitional period. Dąbrowski said you either fall back (reintegration on a lower level), move ahead or end negatively, in suicide or psychosis.

The transition from Level II to Level III involves a fundamental shift that requires a phenomenal amount of energy. This period is the crossroads of development: from here one must either progress or regress. The struggle between Dąbrowski's three factors reflects this transitional crisis: "Do I follow my instincts (first factor), my teachings (second factor) or my heart (third factor)?" The developmental answer is to transform one's lower instincts (automatic reactions like anger) into positive motivation, to resist rote and social answers, and to listen to one's inner sense of what one ought to do.

www.numerons.in

Level III: Spontaneous Multilevel Disintegration

Level III describes a new type of conflict: a vertical conflict between two alternatives that are not simply different, but that exist on different levels. One is genuinely higher and the other is lower in comparison. These vertical conflicts initially arise from involuntary perceptions of higher versus lower choices in life (because they are involuntary, Dąbrowski called it spontaneous multilevel disintegration). You just look at something, maybe for the 1000th time (to use the words of G. K. Chesterton), and it strikes you — you see this one thing differently and once you do, it changes things. You can no longer "go back and see it the way you did before." Dąbrowski called this vertical dimension multilevelness. Multilevelness is a gradual realization of the "possibility of the higher" (a phrase Dąbrowski used frequently) and of the subsequent contrasts between the higher and the lower in life. These vertical comparisons often illustrate the lower, actual behavior of a person in contrast to higher, imagined ideals and alternative idealized choices. Dąbrowski believed that the authentic individual would choose the higher path as the clear and obvious one to follow (erasing the ambivalences and ambitendencies of unilevel conflicts). If the person's actual behavior subsequently falls short of the ideal, internal disharmony and a drive to review and reconstruct one's life often follow. Multilevelness thus represents a new and powerful type of conflict, a conflict that is developmental in Dąbrowski's approach.

www.numerons.in

These vertical conflicts are critical in leading to autonomy and advanced personality growth. If the person is to achieve higher levels, the shift to multilevelness must occur. If a person does not have the developmental potential to move into a multilevel view, then he or she will fall back from the crises of Level II to reintegrate at Level I. In the shift to multilevelness, the horizontal (unilevel), stimulus-response model of life is replaced by a vertical and hierarchical analysis. This vertical view becomes anchored by one's emerging individual value structure, and all events are seen in relation to personal ideals. These personal value ideals become the personality ideal: how the person wants to live his or her life. As events in life are seen in relation to this multilevel, vertical view, it becomes impossible to support positions that favor the lower course when higher goals can be identified (or imagined).

www.numerons.in

Level IV: Directed Multilevel Disintegration

In Level IV the person takes full control of his or her development. The involuntary spontaneous development of Level III is replaced by a deliberate, conscious and self-directed review of life from the multilevel perspective. This level marks the real emergence of the third factor, described by Dąbrowski as an autonomous factor "of conscious choice (valuation) by which one affirms or rejects certain qualities in oneself and in one's environment". The person consciously reviews his or her existing belief system and tries to replace lower, automatic views and reactions with carefully thought out, examined and chosen ideals. These new values will increasingly be reflected in the person's behavior. Behavior becomes less reactive, less automatic and more deliberate as behavioral choices fall under the influence of the person's higher, chosen ideals.

www.numerons.in

Social mores are reviewed and re-accepted by a conscious internalization when the individual feels it is appropriate. Likewise, when the person feels it is proper, a social value is reviewed and may be rejected to be replaced by a self perceived higher alternative value. One's social orientation comes to reflect a deep responsibility based on both intellectual and emotional factors. At the highest levels, "individuals of this kind feel responsible for the realization of justice and for the protection of others against harm and injustice. Their feelings of responsibility extend almost to everything". This perspective results from seeing life in relation to one's hierarchy of values (the multilevel view) and the subsequent appreciation of the potential of how life could be, and ought to be, lived. One's disagreements with the (lower level) world are expressed compassionately in doing what one can to help achieve the "ought."

Given their genuine (authentic) prosocial outlook, people achieving higher development also raise the level of their society. Prosocial here is not just support of the existing social order. If the social order is lower and you are adjusted to it, then you also reflect the lower (negative adjustment in Dąbrowski's terms, a Level I feature). Here, prosocial is a genuine cultivation of social interactions based on higher values. These positions often conflict with the status quo of a lower society (positive maladjustment). In other words, to be maladjusted to a low-level society is a positive feature.

www.numerons.in

Level V: Secondary Integration

The fifth level displays an integrated and harmonious character, but one vastly different from that at the first level. At this highest level, one's behavior is guided by conscious, carefully weighed decisions based on an individualized and chosen hierarchy of personal values. Behavior conforms to this inner standard of how life ought to be lived and, thus, little inner conflict arises.

Level V is often marked by creative expression. Especially at Level V, problem solving and art represent the highest and noblest features of human life. Art captures the innermost emotional states and is based on a deep empathy and understanding of the subject. Often, human suffering and sacrifice are the subjects of these works. Truly visionary works, works that are unique and novel, are created by people expressing a vision unrestrained by convention. Advances in society, through politics, philosophy and religion, are therefore commonly associated with strong individual creativity or accomplishments.

www.numerons.in

Applications of the theory of positive disintegration

Therapy

The theory of positive disintegration has an extremely broad scope and has implications for many areas. One central application applies to psychological and psychiatric diagnosis and treatment. Dąbrowski advocated a comprehensive, multidimensional diagnosis of the person's situation, including symptoms and developmental potentials.

www.numerons.in

Symptoms and developmental potentials

If the disintegration appears to fit into a developmental context, then the person is educated in the theory and encouraged to take a developmental view of his or her situation and experiences. Rather than being eliminated, symptoms are reframed to yield insight and understanding into life and the person's unique situation.

The importance of narratives

Dąbrowski illustrated his theory through autobiographies of and biographies about those who have experienced positive disintegration. The gifted child, the suicidal teen or the troubled artist is often experiencing the features of TPD, and if they accept and understand the meaning of their intense feelings and crises, they can move ahead, not fall apart. The completion of an extensive autobiography to help the individual gain perspective on his or her past and present is a very important component in the autopsychotherapy process. In this process, the therapist plays a very small role and acts more as an initial stimulus than an ongoing therapist. Dąbrowski asked clients to read his books and to see how his ideas may relate to their lives.

www.numerons.in

Autopsychotherapy

For Dąbrowski, the goal of therapy is to eliminate the therapist by providing a context within which a person can understand and help oneself, an approach to therapy that he called autopsychotherapy. The client is encouraged to embark on a journey of self-discovery with an emphasis on looking for the contrast between what is higher versus what is lower within his or her personality and value structure. The person is encouraged to further explore his or her value structure especially as it relates to the rationale and justification of positions. Discrepancies between values and behavior are highlighted. The approach is called autopsychotherapy to emphasize the important role that the individual must play in his or her own therapy process and for that matter, in the larger process of personality development. The individual must come to see that he or she is in charge of determining or creating his or her own unique personality ideal and value structure. This includes a critical review of social mores and values that have been learned.

www.numerons.in

Dąbrowski was very concerned about what he called one-sided development. In a nutshell, Dąbrowski was concerned that many people display significant advanced development in

only one aspect of life, usually intellectual. Dąbrowski used to say that we should try to ignore our strengths and focus on our weaknesses, the mathematical prodigy should focus less on mathematics—he or she is already a whiz at that, and focus more on other topics—the introvert should try to be more extroverted, the extrovert should try to be more introverted. In this way, we do not simply keep enlarging upon our strengths leading towards one-sided development; rather we focus on trying to balance out our development.

www.numerons.in

Overexcitability

Dąbrowski also encouraged people to see their reactions (overexcitabilities) and their phenomenological view of the world in the context of their developmental potential. The experience of and reaction to, crises are a very important aspect of this approach and people are encouraged to experience personal crises with a positive and developmental view.

Dąbrowski reminds clients that without internal disease there is little stimulus for change or growth. Rather than trying to rapidly ameliorate symptoms, this approach encourages individuals to fully experience their feelings and to try to maintain a positive and developmental orientation to what they may perceive as strong depression or anxiety. Of course, this is a unique approach in today's world of seeking immediate and total relief of any unpleasant psychological experience (although it can be compared to Aron's to some extent).

www.numerons.in

Education

Another primary focus is on education, in particular, over the past 25 years, on the experience of creative and gifted students. Dąbrowski hypothesized that these students will disproportionately show strong overexcitability and therefore will be prone to the disintegrative process.

Dąbrowski and the gifted individual

In an appendix to Dąbrowski (1967), results of investigations done in 1962 with Polish youth are reported. Specifically, "a group of gifted children and young people, aged 8 to 23" were examined (p. 251). Of the 80 youth studied, 30 were "intellectually gifted" and 50 were from "drama, ballet, and plastic art schools" (p. 251). Dąbrowski found that every one of the children displayed overexcitability, "which constituted the foundation for the emergence of neurotic and psychoneurotic sets. Moreover it turned out that these children also showed sets of nervousness, neurosis, and psychoneurosis of various kinds and intensities, from light vegetative symptoms, or anxiety symptoms, to distinctly and highly intensive psychasthenic or hysterical sets" (p. 253). Dąbrowski asked why these children should display such "states of nervousness or psychoneurosis" and suggested that it was due to the presence of OE (p. 255). "Probably the cause is more than average sensitivity which not only permits one to achieve outstanding results in learning and work, but at the

www.numerons.in

same time increases the number of points sensitive to all experiences that may accelerate anomalous reactions revealing themselves in psychoneurotic sets" (p. 255).

The association between OE and giftedness appears to be borne out in the research (Lysy and Piechowski 1983; Piechowski 1986; Piechowski and Miller 1995). It appears that at the least OE is a marker of potential for giftedness/creativity. Dąbrowski's basic message is that the gifted will disproportionately display this process of positive disintegration and personality growth.

www.numerons.in

Key ideas

The theory is based on numerous key ideas:

- That our lower animal instincts (first factor) must be inhibited and transformed into "higher" forces for us to be Human (this ability to transform our instincts is what separates us from animals).
- That the common initial personality integration, based upon socialization (second factor), does not reflect true personality.
- At the initial level of integration, there is little internal conflict as when one “goes along with the group,” there is little sense of individual wrong doing. External conflicts often relate to the blockage of social goals – career frustrations for example. The social mores and values prevail with little question or conscious examination.

www.numerons.in

- True personality must be based upon a system of values that are consciously and volitionally chosen by the person to reflect their own individual sense of "how life ought to be" and their "personality ideal" — the ideal person they feel they "ought to be."
- The lower animal instincts and the forces of peer groups and socialization are inferior to the autonomous self (personality) constructed by the conscious person.
- To break down the initial integration, crises and disintegrations are needed, usually provided by life experience.
- These disintegrations are positive if the person can achieve positive and developmental solutions to the situation.
- "Unilevel crises" are not developmental as the person can only choose between equal alternatives (go left or go right?).

www.numerons.in

- A new type of perception involves "multilevelness," a vertical view of life that compares lower versus higher alternatives and now allows the individual to choose

a higher resolution to a crisis over other available, but lower, alternatives — the developmental solution.

- "Positive disintegration" is a vital developmental process.
- Dąbrowski developed the idea of "developmental potential" to describe the forces needed to achieve autonomous personality development.
- Developmental potential includes several factors including innate abilities and talents, "overexcitability" and the "third factor."
- Overexcitability is a measure of an individual's level of nervous response. Dąbrowski found that the exemplars he studied all displayed an overly sensitive nervous system, also making them prone to angst, depression and anxiety - psychoneuroses in Dąbrowski's terms, a very positive and developmental feature.

The third factor is a measure of an individual's drive toward autonomy.

Dąbrowski's approach is very interesting philosophically as it is Platonic, reflecting the bias of Plato toward essence — an individual's essence is a critical determinant of his or her developmental course in life. However, Dąbrowski also added a major existential aspect as well, what one depends upon the anxieties felt and on how one resolves the day to day challenges one faces. Essence must be realized through an existential and experiential process of development. The characterization advanced by Kierkegaard of "Knights of faith" may be compared to Dąbrowski's autonomous individual.

www.numerons.in

Reviewed the role of logic and reasoning in development and concludes that intellect alone does not fully help us know what to do in life. Incorporates Jean Piaget's views of development into a broader scheme guided by emotion. Emotion (how one feels about something) is the more accurate guide to life's major decisions.

When multilevel and autonomous development is achieved, a secondary integration is seen reflecting the mature personality state. The individual has no inner conflict; they are in internal harmony as their actions reflect their deeply felt hierarchy of values.

Rejected Maslow's description of self-actualization (Dąbrowski was a personal friend and correspondent of Maslow's). Actualization of an undifferentiated human self is not a developmental outcome in Dąbrowski's terms. Dąbrowski applied a multilevel (vertical) approach to self and saw the need to become aware of and to inhibit and reject the lower instinctual aspects of the intrinsic human self (aspects that Maslow would have us "embrace without guilt") and to actively choose and assemble higher elements into a new unique self - this process is what differentiates Man from the Animals. Dąbrowski would have us differentiate the initial self into higher and lower aspects, as we define them, and to reject the lower and actualize the higher in creating our unique personality.

Secondary Integration versus self-actualization.

People have often equated Maslow's concept of self-actualization with Dąbrowski's level of secondary integration. There are some major differences between these two ideas. Fundamentally, Maslow described self-actualization as a process where the self is accepted "as is" so, both higher and lower aspects of the self are actualized. Dąbrowski introduces the notion that although the lower aspects may initially be intrinsic to the self, as human beings, we are able to become aware of their lower nature. We are able to develop self-awareness into how we feel about these low levels—if we feel badly about behaving in these lower ways, then we are able to cognitively and volitionally decide to inhibit and eliminate these behaviors. In this way, the higher aspects of the self are actualized while the lower aspects are inhibited and, for Dąbrowski, this is what is unique about humans and sets us apart from animals—animals are not able to differentiate their lower instincts and therefore can not inhibit their animalistic impulses. Dąbrowski has gone beyond Maslow's idea of self-actualization and it is not appropriate to equate the two authors on this point.

www.numerons.in

Obstacles to the theory

Both Dąbrowski and his work have faced many obstacles. Personally, he was severely affected by both World Wars. His work always went against the grain. One can imagine a humanistic theory promoting personal growth in the political atmosphere of Poland in the 1950s and 1960s. Another problem has been language. Dąbrowski wrote in Polish and translated his works into French and Spanish. English was the last language he learned and likely the most difficult in terms of capturing the subtleties of his ideas. In spite of these problems, Dąbrowski persevered with his studies of human development, developed his theory and practiced psychiatry all his life.

www.numerons.in

Dąbrowski died in 1980 and his students went on to explore careers of their own. Many of these students continue to study and speak on the theory, most advancing a deeply personal understanding of what the theory means to them. For many, the theory has become a lifelong friend.

Since 1980, there has been a small but consistent demand for Dąbrowski's works. This demand has largely evolved in the United States where Michael Piechowski applied his vision of the theory to gifted education. Many in education and in gifted education have looked to Dąbrowski's theory to help provide a context for their students. Although a small part of the overall theory, this aspect has generated a number of Master's and Ph.D. theses and introduced the theory to a large audience, an audience eager to learn more about Dąbrowski and his theory.

www.numerons.in

The reader interested in Dąbrowski has faced a serious scarcity of resources, especially of Dąbrowski's English works. His books are long out of print and rare, and his papers are held by a few people but not circulated. There are also many excellent Polish works by Dąbrowski (about 20 books) on the theory, on psychotherapy, on education and on philosophy that await translation into English. Several efforts are underway to remedy this scarcity, including the Dąbrowski website (see below), a current initiative to reprint

Dąbrowski's English books (they are currently available as pdf files on a CD) and ongoing conferences and workshops.

Self-help

Self-help, or self-improvement, is a self-guided improvement—economically, intellectually, or emotionally—often with a substantial psychological basis. There are many different self-help movements and each has its own focus, techniques, associated beliefs, proponents and in some cases, leaders. "Self-help culture, particularly Twelve-Step culture, has provided some of our most robust new language: recovery, dysfunctional families, and, of course, codependency."

www.numerons.in

Self-help often utilizes publicly available information or support groups where people in similar situations join together. From early examples in self-driven legal practice and home-spun advice, the connotations of the phrase have spread and often apply particularly to education, business, psychology and psychotherapy, commonly distributed through the popular genre of self-help books. According to the APA Dictionary of Psychology, potential benefits of self-help groups that professionals may not be able to provide include friendship, emotional support, experiential knowledge, identity, meaningful roles, and a sense of belonging.

Groups associated with health conditions may consist of patients and caregivers. As well as featuring long-time members sharing experiences, these health groups can become lobby groups and clearing-houses for educational material. Those who help themselves by learning about health problems can be said to exemplify self-help, while self-help groups can be seen more as peer-to-peer support.

www.numerons.in

History

Within classical antiquity, Hesiod's Works and Days "opens with moral remonstrances, hammered home in every way that Hesiod can think of." The Stoics offered ethical advice "on the notion of eudaimonia - of well-being, welfare, flourishing." The genre of mirror-of-princes writings, which has a long history in Islamic and Western Renaissance literature, represents a secular cognate of Biblical wisdom literature. Proverbs from many periods, collected and uncollected, embody traditional moral and practical advice of diverse cultures.

The actual phrase "self-help" often appeared relatively early on in a legal context, referring to the doctrine that a party in a dispute has the right to use lawful means on their own initiative to remedy a wrong.

www.numerons.in

For some, George Combe's "Constitution[1828], in the way that it advocated personal responsibility and the possibility of naturally sanctioned self-improvement through education or proper self-control, largely inaugurated the self-help movement;" but it was Samuel Smiles (1812–1904) who published the first self-consciously personal-

development "self-help" book — entitled Self-Help — in 1859. Its opening sentence: "Heaven helps those who help themselves", provides a variation of "God helps them that help themselves", the oft-quoted maxim that also appeared previously in Benjamin Franklin's Poor Richard's Almanac (1733–1758). In the 20th century, "Carnegie's remarkable success as a self-help author" further developed the genre with How to Win Friends and Influence People in 1936. Having failed in several careers, Carnegie became fascinated with success and its link to self-confidence, and his books have since sold over 50 million copies. Earlier in 1902 James Allen published As a Man Thinketh, which proceeds from the conviction that "a man is literally what he thinks, his character being the complete sum of all his thoughts." Noble thoughts, the book maintains, make for a noble person, whilst lowly thoughts make for a miserable person; and Napoleon Hill's Think and Grow Rich (1937) described the use of repeated positive thoughts to attract happiness and wealth by tapping into an "Infinite Intelligence".

www.numerons.in

Dr Neville Yeomans, an Australian Psychiatrist, Clinical Sociologist, Psychologist and Barrister pioneered Self-Help and Mutual Help in Australia through his pioneering work at Australia's first therapeutic community Fraser House (1959–1968), an 80 bed residential unit in North Ryde Sydney; and former inmates of this unit started many self-help groups around Sydney.

Postmodernistic influence

It is however in the final third of the 20th century that "the tremendous growth in self-help publishing...in self-improvement culture" really takes off - something which must be linked to postmodernism itself - to the way "postmodern subjectivity constructs self-reflexive subjects-in-process." Arguably at least, "in the literatures of self-improvement...that crisis of subjecthood is not articulated but enacted - demonstrated in ever-expanding self-help book sales."

www.numerons.in

The conservative turn of the neoliberal decades also meant a decline in traditional political activism, and increasing "social isolation; Twelve-Step recovery groups were one context in which individuals sought a sense of community...yet another symptom of the psychologizing of the personal" to more radical critics. Indeed, "some social theorist have argued that the late-20th century preoccupation with the self serves as a tool of social control: soothing political unrest...[for] one's own pursuit of self-invention."'

The market

At the start of the 21st century, "the self-improvement industry, inclusive of books, seminars, audio and video products, and personal coaching, is said to constitute a 2.48-billion dollars-a-year industry" in the States alone. By 2006, research firm Marketdata estimated the "self-improvement" market in the U.S. as worth more than $9 billion — including infomercials, mail-order catalogs, holistic institutes, books, audio cassettes, motivation-speaker seminars, the personal coaching market, weight-loss and stress-management programs. Marketdata projected that the total market size would grow to over $11 billion by 2008. Whether temporarily dented or not by the Credit crunch, the

www.numerons.in

trend would seem likely to continue upwards, with global figures echoing American leadership.

Within the context of this larger market, group and corporate attempts to aid the "seeker" have moved into the "self-help" marketplace, with LGATs and psychotherapy systems represented. These offer more-or-less prepackaged solutions to instruct people seeking their own individual betterment, just as "the literature of self-improvement directs the reader to familiar frameworks...what the French fin de siecle social theorist Gabriel Tarde called 'the grooves of borrowed thought'."

www.numerons.in

Self-help and professional service delivery

Self-help and mutual-help are very different to, though may complement, service delivery by professionals, as may be seen for example in the interface between local self-help and International Aid's service delivery model.

Conflicts can and do arise on that interface, however, with some professionals considering that "the twelve-step approach encourages a kind of contemporary version of 19th-century amateurism or enthusiasm in which self-examination and very general social observations are enough to draw rather large conclusions."

Research

www.numerons.in

The rise of self-help culture has inevitably led to boundary disputes with other approaches and disciplines. Some would object to their classification as "self-help" literature, as with "Deborah Tannen's denial of the self-help role of her books" so as to maintain her academic credibility, aware of the danger that "writing a book that becomes a popular success...all but ensures that one's work will lose its long-term legitimacy."

Placebo effects can never be wholly discounted. Thus careful studies of "the power of subliminal self-help tapes...showed that their content had no real effect...But that's not what the participants thought." "If they thought they'd listened to a self-esteem tape (even though half the labels were wrong), they felt that their self-esteem had gone up. No wonder people keep buying subliminal tape: even though the tapes don't work, people think they do." One might then see much of the self-help industry as part of the "skin trades. People need haircuts, massage, dentistry, wigs and glasses, sociology and surgery, as well as love and advice." - a skin trade, "not a profession and a science" Its practitioners would thus be functioning as "part of the personal service industry rather than as mental health professionals." While "there is no proof that twelve-step programs 'are superior to any other intervention in reducing alcohol dependence or alcohol-related problems'," at the same time it is clear that "there is something about 'groupishness' itself which is curative." Thus for example "smoking increases mortality risk by a factor of just 1.6, while social isolation does so by a factor of 2.0...suggest[ing] an added value to self-help groups such as Alcoholics Anonymous as surrogate communities."

www.numerons.in

Positive psychology represents attempts to use the scientific method to empower genius and talent

Some psychologists advocate a positive psychology, and explicitly embrace an empirical self-help philosophy; "the role of positive psychology is to become a bridge between the ivory tower and the main street - between the rigor of academe and the fun of the self-help movement." They aim to refine the self-improvement field by way of an intentional increase in scientifically sound research and well-engineered models. The division of focus and methodologies has produced several subfields, in particular: general positive psychology, focusing primarily on the study of psychological phenomenon and effects; and personal effectiveness, focusing primarily on analysis, design and implementation of qualitative personal growth. This includes the intentional training of new patterns of thought and feeling. As business strategy communicator Don Tapscott puts it, "The design industry is something done to us. I'm proposing we each become designers. But I suppose 'I love the way she thinks' could take on new meaning."

www.numerons.in

Criticisms of the movement

Scholars have targeted self-help claims as misleading and incorrect. In 2005, Steve Salerno portrayed the American self-help movement—he uses the acronym SHAM: the Self-Help and Actualization Movement -- not only as ineffective in achieving its goals, but also as socially harmful. "Salerno says that 80 percent of self-help and motivational customers are repeat customers and they keep coming back 'whether the program worked for them or not'." Others similarly point out that with self-help books "supply increases the demand...The more people read them, the more they think they need them...more like an addiction than an alliance."

www.numerons.in

Self-help writers have been described as working "in the area of the ideological, the imagined, the narrativized....although a veneer of scientism permeates the[ir] work, there is also an underlying armature of moralizing."

Christopher Buckley in his book God is My Broker asserts: "The only way to get rich from a self-help book is to write one."

In the media

Television portrayals

Several TV shows have featured the use of self-help CDs:

www.numerons.in

- On the sitcom Friends, the character of Chandler Bing listens to a self-hypnosis tape to quit smoking. Unfortunately the tape is designed for females, resulting in Chandler coming under the suggestion of being a "strong, confident woman." This further results in Chandler applying Chapstick like a woman applying lipstick, and emerging from the shower with a towel around his bosom and a turban on his head.

- On the comedy-drama Gilmore Girls, the character of Luke Danes listens to a self-help CD to deal with depression.
- On the reality show Mythbusters, cast members Grant Imahara, Tory Belleci, and Kari Byron tested the effectiveness of self-help CDs by attempting to cure Grant's motion sickness and Adam Savage's fear of bees, and to alter Kari's eye color. All three tests proved unsuccessful, thus busting the myth.
- Dexter character, Jordan Chase, is a self help guru with a personality cult and the motto, "Take it!."

www.numerons.in

Parodies and fictional analogies

The self-help world has become the target of parodies. Walker Percy's odd genre-busting Lost in the Cosmos has been described as "a parody of self-help books, a philosophy textbook, and a collection of short stories, quizzes, diagrams, thought experiments, mathematical formulas, made-up dialogue". In their 2006 book Secrets of The Superoptimist, authors W.R. Morton and Nathanel Whitten revealed the concept of "superoptimism" as a humorous antidote to the overblown self-help book category. In his comedy special Complaints and Grievances, George Carlin observes that there is "no such thing" as self-help: anyone looking for help from someone else doesn't technically get "self" help; and one who accomplishes something without help, didn't need help to begin with. In the semi-satiric dystopia Oryx and Crake, university literary studies have declined to the point that the protagonist, Snowman, is instructed to write his thesis on self-help books as literature; more revealing of the author and society that produced them than genuinely helpful.

www.numerons.in

Self-help culture entered fiction within fiction with 'the Wuthering Heights rage counselling session' chaired (perhaps injudiciously) by Miss Haversham: at the close of a difficult session, "'Right', she said, switching her pistol to safe and regaining her breath, 'I think that pretty much concludes this session of Jurisfiction Rage Counselling. What did we learn?' The co-characters all stared at her, dumbstruck."

Human Potential Movement

The Human Potential Movement (HPM) arose out of the social and intellectual milieu of the 1960s and formed around the concept of cultivating extraordinary potential that its advocates believed to lie largely untapped in all people. The movement took as its premise the belief that through the development of "human potential", humans can experience an exceptional quality of life filled with happiness, creativity, and fulfillment. As a corollary, those who begin to unleash this assumed potential often find themselves directing their actions within society towards assisting others to release their potential. Adherents believe that the net effect of individuals cultivating their potential will bring about positive social change at large.

www.numerons.in

Roots

The movement has its conceptual roots in existentialism and humanism. Its emergence is linked to humanistic psychology, also known as the "3rd force" in psychology (after psychoanalysis and behaviorism, and before the "4th force" of transpersonal psychology—which emphasizes esoteric, psychic, mystical, and spiritual development). Some commentators consider the HPM synonymous with humanistic psychology. The movement is strongly influenced by Abraham Maslow's theory of self-actualization as the supreme expression of a human's life.

www.numerons.in

Some sources credit the name "Human Potential Movement" to George Leonard.

Relationship to other fields

The human potential movement is sometimes categorised under the broader umbrella of the New Age movement. HPM distinguishes itself ideologically from other New Age trends by an emphasis on the individual development of secular human capabilities—as opposed to the more spiritual New Age views. However, some participants rarely make this distinction, and some who embrace the ideas of the human potential movement also tend to embrace more spiritual ideas within the New Age movement.

Christopher Lasch notes the impact of the human potential movement via the therapeutic sector:

The new therapies spawned by the human potential movement, according to Peter Marin, teach that "the individual will is all powerful and totally determines one's fate"; thus they intensify the "isolation of the self."

www.numerons.in

The HPM in many ways functioned as the progenitor of the contemporary industry surrounding personal growth and self-help.

Authors and essayists

Michael Murphy and Dick Price founded the Esalen Institute in 1962, primarily as a center for the study and development of human potential, and some people continue to regard Esalen as the geographical center of the movement today. Aldous Huxley gave lectures on the "Human Potential" at Esalen in the early 1960s, and some people consider his ideas as also fundamental to the movement.

George Leonard, a magazine writer and editor who conducted research for an article on human potential, became an important early influence on Esalen. Leonard claims that he coined the phrase "Human Potential Movement" during a brainstorming session with Murphy, and popularized it in his 1972 book "The Transformation: A Guide to the Inevitable Changes in Mankind". Leonard worked closely with the Esalen Institute afteward, and in 2005 served as its president.

www.numerons.in

Notable proponents

- William James (1842–1910), an early proponent

- Fritz Perls (1893–1970)
- Aldous Huxley (1894–1963)
- Carl Rogers (1902–1987)
- Viktor Frankl (1905–1997)
- Viola Spolin (1906-1994)
- Joshua Loth Liebman (1907–1948)
- Abraham Maslow (1908–1970)
- Alan Watts (1915–1973)
- Harvey Jackins (1916–1999)
- Alexander Everett (1921–2005)
- George Leonard (1923–2010)
- Stan Dale (1929–2007)
- Michael Murphy (b. 1930)
- Werner Erhard (b. 1935)
- Marilyn Ferguson (1938–2008)
- Jean Houston (b. 1937)
- Fernando Flores (b. 1943)
- Anthony Robbins (b. 1960)

www.numerons.in

Education reform

Education reform can broadly be construed to mean the change in any act or experience that has a formative effect on the mind, character or physical ability of an individual. In its technical sense, education reform is the change in the process by which society deliberately transmits and develops its accumulated knowledge, skills, and values from one generation to another. Throughout history and the present day, the meaning and methods of education have changed through debates over what content or experiences result in an educated individual or an educated society.

www.numerons.in

Changes may be implemented by individual educators and/or by broad-based school organization and/or by curriculum changes with performance evaluations.

Early history

Classical times

Plato believed that children would never learn unless they wanted to learn. In The Republic, he said, " . . compulsory learning never sticks in the mind." An important educational debate in the time of the Roman Empire arose after Christianity had achieved broad acceptance. The question concerned the educational value of pre-Christian classical thought: "Given that the body of knowledge of the pre-Christian Romans was heathen in origin, was it safe to teach it to Christian children?"

www.numerons.in

Modern reforms

Though educational reform undoubtedly occurred on a local level at various points throughout history, the modern notion of education reform is tied with the spread of Compulsory education - education reforms did not become widespread until after organized schooling was sufficiently systematized to be 'reformed.' (Compulsory education refers to a period of educational attendance required of all persons, normally between certain ages, such as six to sixteen years, and/or up to a certain grade level.)

In the modern world, economic growth and the spread of democracy have raised the value of education and increased the importance of ensuring that all children and adults have access to high quality and effective education. Modern education reforms are increasingly driven by a growing understanding of what works in education and how to go about successfully improving teaching and learning in schools.

www.numerons.in

Reforms of classical education

Western classical education as taught from the 18th to the 19th century has disorder that inspired reformers.

Classical education is most concerned with answering the who, what, where, and when? questions that concern a majority of students. Unless carefully taught, group instructions naturally neglects the theoretical "why" and "which" questions that strongly concern a minority of students.

Classical education in this period also depreciated local languages and cultures in favor of ancient languages (Greek and Latin) and their cultures. This produced odd social effects in which an intellectual class might be more loyal to ancient cultures and institutions than to their native vernacular languages and their actual governing authorities.

www.numerons.in

Educational economies in the 19th century

Before the advent of government-funded public schools, the primary mode of education for those of the lower classes was the charity school, pioneered during the 19th century by Protestant organizations and adapted for use by the Roman Catholic Church and governmental bodies. Because these schools operated on very small budgets and attempted to serve as many needy children as possible, economic factors were prominent in their design.

The basic program was to develop "grammar" schools. These taught only grammar and bookkeeping. This program permits people to start businesses to make money, and gives them the skills to continue their education inexpensively from books. "Grammar" was the first third of the then-prevalent system of Classical Education.

www.numerons.in

The ultimate development of the grammar school was by Joseph Lancaster and Adam Bell who developed the monitorial system. Lancaster started as a poor Quaker in early 19th century London. Bell started the Madras School of India. The monitorial system uses slightly more-advanced students to teach less-advanced students, achieving student-

teacher ratios as small as 2, while educating more than a thousand students per adult. Lancaster promoted his system in a piece called Improvements in Education that spread widely throughout the English-speaking world.

Discipline and labor in a Lancaster school were provided by an economic system. Scrip, a form of money meaningless outside the school, was created at a fixed exchange rate from a student's tuition. Every job of the school was bid-for by students in scrip. The highestrendered. However, any student tutor could auction positions in his or her classes. Besides tutoring, students could use scrip to buy food, school supplies, books, and childish luxuries in a school store. The adult supervisors were paid from the bids on jobs.

www.numerons.in

With fully developed internal economies, Lancaster schools provided a grammar-school education for a cost per student near $40 per year in 1999 U.S. dollars. The students were very clever at reducing their costs, and once invented, improvements were widely adopted in a school. For example, Lancaster students, motivated to save scrip, ultimately rented individual pages of textbooks from the school library, and read them in groups around music stands to reduce textbook costs. Exchanges of tutoring, and using receipts from "down tutoring" to pay for "up tutoring" were commonplace.

Established educational elites found Lancaster schools so threatening that most English-speaking countries developed mandatory publicly paid education explicitly to keep public education in "responsible" hands. These elites said that Lancaster schools might become dishonest, provide poor education and were not accountable to established authorities. Lancaster's supporters responded that any schoolchild could avoid cheats, given the opportunity, and that the government was not paying for the education, and thus deserved no say in their composition.

www.numerons.in

Lancaster, though motivated by charity, claimed in his pamphlets to be surprised to find that he lived well on the income of his school, even while the low costs made it available to the poorest street-children. Ironically, Lancaster lived on the charity of friends in his later life.

Progressive reforms in Europe and the United States

The term progressive in education has been used somewhat indiscriminately; there are a number of kinds of educational progressivism, most of the historically significant kinds peaking in the period between the late 19th and the middle of the 20th centuries.

Child-study

www.numerons.in

Jean-Jacques Rousseau has been called the father of the child-study movement. It has been said that Rousseau "discovered" the child (as an object of study).

Rousseau's principal work on education is Emile: Or, On Education, in which he lays out an educational program for a hypothetical newborn's education to adulthood. Rousseau provided a dual critique of both the vision of education set forth in Plato's Republic and

also of the society of his contemporary Europe and the educational methods he regarded as contributing to it; he held that a person can either be a man or a citizen, and that while Plato's plan could have brought the latter at the expense of the former, contemporary education failed at both tasks. He advocated a radical withdrawal of the child from society and an educational process that utilized the natural potential of the child and its curiosity, teaching it by confronting it with simulated real-life obstacles and conditioning it by experience rather than teaching it intellectually. His ideas were rarely implemented directly, but were influential on later thinkers, particularly Johann Heinrich Pestalozzi and Friedrich Wilhelm August Fröbel, the inventor of the kindergarten.

www.numerons.in

Transcendentalist education

H. D. Thoreau's Walden and reform essays in the mid-19th century were influential also (see the anthology Uncommon Learning: Henry David Thoreau on Education, Boston, 1999). For a look at transcendentalist life, read Louisa May Alcott's Little Women. Her father, A. Bronson Alcott, a close friend of Thoreau's, pioneered progressive education for young people as early as the 1830s.

The transcendental education movement failed, because only the most gifted students ever equaled the skills of their classically educated teachers. These students would, of course, succeed in any educational regime. Accounts seem to indicate that the students were happy, but often pursued classical education later in life.

National identity

www.numerons.in

Education is often seen in Europe and Asia as an important system to maintain national, cultural and linguistic unity. Prussia instituted primary school reforms expressly to teach a unified version of the national language, "Hochdeutsch". One significant reform was kindergarten, whose purpose was to have the children spend time in supervised activities in the national language, when the children were young enough that they could easily learn new language skills.

Since most modern schools copy the Prussian models, children start school at an age when their language skills remain plastic, and they find it easy to learn the national language. This was an intentional design on the part of the Prussians.

In the U.S. over the last twenty years, more than 70% of non-English-speaking school-age immigrants have arrived in the U.S. before they were 6 years old. At this age, they could have been taught English in school, and achieved a proficiency indistinguishable from a native speaker. In other countries, such as the Soviet Union, France, Spain, and Germany this approach has dramatically improved reading and math test scores for linguistic minorities.

www.numerons.in

Dewey

John Dewey, a philosopher and educator, was heavily influential in American and international education, especially during the first four decades of the 20th century. An important member of the American Pragmatist movement, he carried the subordination of knowledge to action into the educational world by arguing for experiential education that would enable children to learn theory and practice simultaneously; a well-known example is the practice of teaching elementary physics and biology to students while preparing a meal. He was a harsh critic of "dead" knowledge disconnected from practical human life, foreshadowing Paulo Freire's attack on the "banking concept of education."

www.numerons.in

Dewey criticized the rigidity and volume of humanistic education, and the emotional idealizations of education based on the child-study movement that had been inspired by Bill Joel and those who followed him. He presented his educational theories as a synthesis of the two views. His slogan was that schools should encourage children to "Learn by doing." He wanted people to realize that children are naturally active and curious. Dewey's understanding of logic is best presented in his "Logic, the Theory of Inquiry" (1938). His educational theories were presented in "My Pedagogic Creed", The School and Society, The Child and Curriculum, and Democracy and Education (1916).

The question of the history of Deweyan educational practice is a difficult one. He was a widely known and influential thinker, but his views and suggestions were often misunderstood by those who sought to apply them, leading some historians to suggest that there was never an actual implementation on any considerable scale of Deweyan progressive education. The schools with which Dewey himself was most closely associated (though the most famous, the "Laboratory School", was really run by his wife) had considerable ups and downs, and Dewey left the University of Chicago in 1904 over issues relating to the Dewey School.

www.numerons.in

Dewey's influence began to decline in the time after the Second World War and particularly in the Cold War era, as more conservative educational policies came to the fore.

The administrative progressives

The form of educational progressivism which was most successful in having its policies implemented has been dubbed "administrative progressivism" by historians. This began to be implemented in the early 20th century. While influenced particularly in its rhetoric by Dewey and even more by his popularizers, administrative progressivism was in its practice much more influenced by the industrial revolution and the concept economies of scale.

The administrative progressives are responsible for many features of modern American education, especially American high schools: counseling programs, the move from many small local high schools to large centralized high schools, curricular differentiation in the form of electives and tracking, curricular, professional, and other forms of standardization, and an increase in state and federal regulation and bureaucracy, with a corresponding reduction of local control at the school board level. (Cf. "State, federal, and local control of education in the United States", below) (Tyack and Cuban, pp. 17–26)

www.numerons.in

These reforms have since become heavily entrenched, and many today who identify themselves as progressives are opposed to many of them, while conservative education reform during the Cold War embraced them as a framework for strengthening traditional curriculum and standards.

In more recent times, groups such as the think tank Reform's education division, and S.E.R. have attempted to pressure the government of the U.K. into more modernist educational reform, though this has been met with limited success.

www.numerons.in

Critiques of progressive and classical reforms

Many progressive reforms failed to transfer learned skills. Evidence suggests that higher-order thinking skills are unused by many people (cf. Jean Piaget, Isabel Myers, and Katharine Cook Briggs). Some authorities say that this refutes key assumptions of progressive thinkers such as Dewey.

Jean Piaget was a Swiss psychologist who studied people's developmental stages. He showed by widely reproduced experiments that most young children do not analyze or synthesize as Dewey expected. Some authorities therefore say that Dewey's reforms do not apply to the primary education of young children.

Katherine Briggs and her daughter Isabel Myers developed a psychological test that reproducibly identifies sixteen distinct human temperaments, building on work by Jung. A wide class of temperaments ("Sensors", half by category, 60% of the general population) prefer to use concrete information such as theories or logical inference. In terms of education, some authorities interpret this to mean that 60% of the general population only use, and therefore would prefer to learn answers to concrete "Who, what, when, where", and "how" questions, rather than answers to the theoretical "which" and "why" questions advocated by progressives. This information was confirmed (on another research track) by Jean Piaget, who discovered that nearly 60% of adults never habitually use what he called "formal operational reasoning", a term for the development and use of theories and explicit logic. If this criticism is true, then schools that teach only principles would fail to educate 60% of the general population.

www.numerons.in

The data from Piaget, Myers and Briggs can also be used to criticize classical teaching styles that never teach theory or principle. In particular, a wide class of temperaments ("Intuitives", half by category, 40% of the general population) prefer to reason from trusted first principles, and then apply that theory to predict concrete facts. In terms of education, some authorities interpret this to mean that 40% of the general population prefer to use, and therefore want to learn, answers to theoretical "Which and "Why" questions, rather than answers to the concrete "Who, what, when, where" and "How" questions.

www.numerons.in

The synthesis resulting from this two-part critique is a "neoclassical" learning theory similar to that practiced by Marva Collins, in which both learning styles are accommodated. The classroom is filled with facts, that are organized with theories, providing a rich environment to feed children's natural preferences. To reduce the limitations of depending

only on natural preferences, all children are required to learn both important facts, and important forms of reasoning.

Diane Ravitch argues that "progressive" reformers have replaced a challenging liberal arts curriculum with ever-lower standards and indoctrination, particularly in inner-city schools, thereby preventing vast numbers of students from achieving their full potential.

Education reform in the United States since the mid-20th Century

www.numerons.in

Reforms arising from the civil rights era

From the 1950s to the 1970s, many of the proposed and implemented reforms in U.S. education stemmed from the Civil Rights Movement and related trends; examples include ending racial segregation, and busing for the purpose of desegregation, affirmative action, and banning of school prayer.

Reform efforts in the 1980s

In the 1980s, some of the momentum of education reform moved from the left to the right, with the release of A Nation at Risk, Ronald Reagan's efforts to reduce or eliminate the United States Department of Education. In the latter half of the decade, E.D. Hirsch put forth an influential attack on one or more versions of progressive education, advocating an emphasis on "cultural literacy"--the facts, phrases, and texts that Hirsch asserted every American had once known and that now only some knew, but was still essential for decoding basic texts and maintaining communication. Hirsch's ideas remain significant through the 1990s and into the 21st century, and are incorporated into classroom practice through textbooks and curricula published under his own imprint.

www.numerons.in

Reform efforts in the 1990s and 2000s

Most states and districts in the 1990s adopted Outcome-Based Education (OBE) in some form or another. A state would create a committee to adopt standards, and choose a quantitative instrument to assess whether the students knew the required content or could perform the required tasks. The standards-based National Education Goals (Goals 2000) were set by the U.S. Congress in the 1990s. Many of these goals were based on the principles of outcomes-based education, and not all of the goals were attained by the year 2000 as was intended. The standards-based reform movement culminated in the No Child Left Behind Act of 2001, which as of 2009 is still an active nation-wide mandate in the United States.

www.numerons.in

OBE reforms usually had other disputed methods, such as constructivist mathematics and whole language, added onto them. Some proponents advocated replacing the traditional high school diploma with a Certificate of Initial Mastery. Other reform movements were school-to-work, which would require all students except those in a university track to spend substantial class time on a job site. See also Uncommon Schools.

Contemporary issues

In the first decade of the 21st century, several issues are salient in debates over further education reform:

- Longer school day or school year
- After-school tutoring
- Charter schools, school choice, or school vouchers
- Smaller class sizes
- Improved teacher quality
  - Improved training
  - Higher credential standards
  - Generally higher pay to attract more qualified applicants
  - Performance bonuses ("merit pay")
  - Firing low-performing teachers
- Internet and computer access in schools
- Track and reduce drop-out rate
- Track and reduce absenteeism
- English-only vs. bilingual education
- Mainstreaming special education students
- Content of curriculum standards and textbooks
- Funding, neglected infrastructure, and adequacy of educational supplies

www.numerons.in

Funding levels

www.numerons.in

Although many people have claimed that U.S. public schools are underfunded, there are few countries that spend as much per student on education. However, the United States is well known for huge inequalities in the economics of school districts.

Among developed countries, there is almost no correlation between spending on education and educational performance. Top performers include Singapore, Finland and Korea, all with relatively low spending on education, while high spenders including Norway and Luxembourg have relatively low performance. However, within countries, differences in spending between schools or districts may accentuate inequalities if they result in the best teachers moving to teach in the most wealthy areas.

According to a 2005 report from the OECD, the United States is tied for first place with Switzerland when it comes to annual spending per student on its public schools, with each of those two countries spending more than $11,000 (in U.S. currency). Despite this high level of funding, U.S. public schools lag behind the schools of other rich countries in the areas of reading, math, and science.

www.numerons.in

According to a 2007 article in The Washington Post, the Washington D.C. public school district spends $12,979 per student per year. This is the third highest level of funding per student out of the 100 biggest school districts in the U.S. Despite this high level of funding, the school district provides outcomes that are lower than the national average. In reading

and math, the district's students score the lowest among 11 major school districts—even when poor children are compared only with other poor children. Thirty-three percent of poor fourth graders in the U.S. lack basic skills in math, but in Washington D.C., it's 62%.

According to a 2006 study by the Goldwater Institute, Arizona's public schools spend 50% more per student than Arizona's private schools. The study also says that while teachers constitute 72% of the employees at private schools, they make up less than half of the staff at public schools. According to the study, if Arizona's public schools wanted to be like private schools, they would have to hire approximately 25,000 more teachers, and eliminate 21,210 administration employees. The study also said that public school teachers are paid about 50% more than private school teachers.

In 1985 in Kansas City, Missouri, a judge ordered the school district to raise taxes and spend more money on public education. Spending was increased so much, that the school district was spending more money per student than any of the country's other 280 largest school districts. Although this very high level of spending continued for more than a decade, there was no improvement in the school district's academic performance.

According to a 1999 article by William J. Bennett, former U.S. Secretary of Education, increased levels of spending on public education have not made the schools better. Among many other things, the article cites the following statistics:

Between 1960 and 1995, U.S. public school spending per student, adjusted for inflation, increased by 212%.

www.numerons.in

In 1994, less than half of all U.S. public school employees were teachers.

Out of 21 industrialized countries, U.S. 12th graders ranked 19th in math, 16th in science, and last in advanced physics.

Alternatives to public education

In the United States, Private schools (independent schools) have long been an alternative to public education for those with the ability to pay tuition. These include religious schools, preparatory and boarding schools, and schools based on alternative philosophies such as Montessori education. Over 4 million students, about 1 child in 12, attend religious schools in the United States, most of them Christian. Montessori pre- and primary school programs employ alternative theories of guided exploration which seek to embrace children's natural curiosity rather than, for instance, scolding them for falling out of rank.

Home education is favored by a growing number of parents who take direct responsibility for their children's education rather than enrolling them in local public schools seen as not meeting expectations.

School choice

Libertarian theorists such as Milton Friedman advocate school choice to promote excellence in education through competition. A highly competitive 'market' for schools would eliminate the need to otherwise attempt a workable method of accountability for results. Public education vouchers would permit guardians to select and pay any school, public or private, with public funds currently allocated to local public schools. The theory is that children's guardians will naturally shop for the best schools, much as is already done at college level.

www.numerons.in

Though appealing in theory, many reforms based on school choice have not led to substantial improvements in teaching and learning. For instance, New Zealand's landmark reform in 1989, during which schools were granted substantial autonomy, funding was devolved to schools, and parents were given a free choice of which school their children would attend, led to only modest improvements in most schools and was associated with increases in inequity and greater racial and social stratification in schools. Similar results have been found in other jurisdictions. Though discouraging, the failure of choice to lead to improvement in student learning often seems to reflect weaknesses in the way that choice is implemented rather than a failure of the basic principle itself.

Barriers to reform

A recent Fordham Institute study found that some labor agreements with teachers' unions may restrict the ability of school systems to implement merit pay and other reforms. Contracts were more restrictive in districts with high concentrations of poor and minority students. The methodology and conclusions of the study have been criticized by teachers' unions.

www.numerons.in

Another barrier to reform is assuming that schools are like businesses—when in fact they are very different.

Motivations

Education reform has been pursued for a variety of specific reasons, but generally most reforms aim at redressing some societal ills, such as poverty-, gender-, or class-based inequities, or perceived ineffectiveness. Reforms are usually proposed by thinkers who aim to redress societal ills or institute societal changes, most often through a change in the education of the members of a class of people—the preparation of a ruling class to rule or a working class to work, the social hygiene of a lower or immigrant class, the preparation of citizens in a democracy or republic, etc. The idea that all children should be provided with a high level of education is a relatively recent idea, and has arisen largely in the context of Western democracy in the 20th century.

www.numerons.in

The "beliefs" of school districts are optimistic that quite literally "all students will succeed", which in the context of high school graduation examination in the United States, all students in all groups, regardless of heritage or income will pass tests that in the introduction typically fall beyond the ability of all but the top 20 to 30 percent of students. The claims clearly renounce historical research that shows that all ethnic and income

groups score differently on all standardized tests and standards based assessments and that students will achieve on a bell curve. Instead, education officials across the world believe that by setting clear, achievable, higher standards, aligning the curriculum, and assessing outcomes, learning can be increased for all students, and more students can succeed than the 50 percent who are defined to be above or below grade level by norm referenced standards.

States have tried to use state schools to increase state power, especially to make better soldiers and workers. This strategy was first adopted to unify related linguistic groups in Europe, including France, Germany and Italy. Exact mechanisms are unclear, but it often fails in areas where populations are culturally segregated, as when the U.S. Indian school service failed to suppress Lakota and Navaho, or when a culture has widely respected autonomous cultural institutions, as when the Spanish failed to suppress Catalan.

Many students of democracy have desired to improve education in order to improve the quality of governance in democratic societies; the necessity of good public education follows logically if one believes that the quality of democratic governance depends on the ability of citizens to make informed, intelligent choices, and that education can improve these abilities.

Politically motivated educational reforms of the democratic type are recorded as far back as Plato in The Republic. In the United States of America, this lineage of democratic education reform was continued by Thomas Jefferson, who advocated ambitious reforms partly along Platonic lines for public schooling in Virginia.

www.numerons.in

Another motivation for reform is the desire to address socio-economic problems, which many people see as having significant roots in lack of education. Starting in the 20th century, people have attempted to argue that small improvements in education can have large returns in such areas as health, wealth and well-being. For example, in Kerala, India in the 1950s, increases in women's health were correlated with increases in female literacy rates. In Iran, increased primary education was correlated with increased farming efficiencies and income. In both cases some researchers have concluded these correlations as representing an underlying causal relationship: education causes socio-economic benefits. In the case of Iran, researchers concluded that the improvements were due to farmers gaining reliable access to national crop prices and scientific farming information.

Digital Education

The movement to use computers more in education naturally includes many unrelated ideas, methods, and pedagogies since there are many uses for digital computers. For example, the fact that computers are naturally good at math leads to the question of the use of calculators in math education. The Internet's communication capabilities make it potentially useful for collaboration, and foreign language learning. The computer's ability to simulate physical systems makes it potentially useful in teaching science. More often, however, debate of digital education reform centers around more general applications of computers to education, such as electronic test-taking and online classes.

The idea of creating artificial intelligence led some computer scientists to believe that teachers could be replaced by computers, through something like an expert system; however, attempts to accomplish this have predictably proved inflexible. The computer is now more understood to be a tool or assistant for the teacher and students.

Harnessing the richness of the Internet is another goal. In some cases classrooms have been moved entirely online, while in other instances the goal is more to learn how the Internet can be more than a classroom.

www.numerons.in

Web-based international educational software is under development by students at New York University, based on the belief that current educational institutions are too rigid: effective teaching is not routine, students are not passive, and questions of practice are not predictable or standardized. The software allows for courses tailored to an individual's abilities through frequent and automatic multiple intelligences assessments. Ultimate goals include assisting students to be intrinsically motivated to educate themselves, and aiding the student in self-actualization. Courses typically taught only in college are being reformatted so that they can be taught to any level of student, whereby elementary school students may learn the foundations of any topic they desire. Such a program has the potential to remove the bureaucratic inefficiencies of education in modern countries, and with the decreasing digital divide, help developing nations rapidly achieve a similar quality of education. With an open format similar to Wikipedia, any teacher may upload their courses online and a feedback system will help students choose relevant courses of the highest quality. Teachers can provide links in their digital courses to webcast videos of their lectures. Students will have personal academic profiles and a forum will allow students to pose complex questions, while simpler questions will be automatically answered by the software, which will bring you to a solution by searching through the knowledge database, which includes all available courses and topics.

www.numerons.in

The 21st century ushered in the acceptance and encouragement of internet research conducted on college and university campuses, in homes, and even in gathering areas of shopping centers. Addition of cyber cafes on campuses and coffee shops, loaning of communication devices from libraries, and availability of more portable technology devices, opened up a world of educational resources. Availability of knowledge to the elite had always been obvious, yet provision of networking devices, even wireless gadget sign-outs from libraries, made availability of information an expectation of most persons. Cassandra Bolyard Whyte researched the future of computer use on campuses focusing on student affairs. Though at first seen as a data collection and outcome reporting tool, the use in the classrooms, meeting areas, and homes has continued to unfold. The sole dependence on paper resources has diminished and e-books over portable reading devices and on-line courses have become a staple provided by higher education institutions according to Whyte.

www.numerons.in

Notable reforms

Some of the methods and reforms have gained permanent advocates, and are widely utilized.

Many educators now believe that anything that more precisely meets the needs of the child will work better. This was initiated by M. Montessori and is still utilized in Montessori schools.

The teaching method must be teachable! This is a lesson from both Montessori and Dewey. This view now has very wide currency, and is used to select much of the curricula of teachers' colleges.

Conservative programs are often based on classical education, which is seen by conservatives to reliably teach valuable skills in a developmentally appropriate order to the majority of Myers-Briggs temperaments, by teaching facts.

New programs based on modern learning theories that test individual learning, and teach to mastery of a subject have been proved by the Kentucky Education Reform Act (KERA) to be far more effective than group instruction with compromise schedules, or even class-size reduction

Schools with limited resources, such as most public schools and most third-world and missionary schools, use a grammar-school approach. The evidence of Lancaster schools suggests using students as teachers. If the culture supports it, perhaps the economic discipline of the Lancaster school can reduce costs even further. However, much of the success of Lancaster's "school economy" was that the children were natives of an intensely mercantile culture.

In order to be effective, classroom instruction needs to change subjects at times near a typical student's attention span, which can be as frequently as every two minutes for young children. This is an important part of Marva Collins' method.

The Myers-Briggs temperaments fall into four broad categories, each sufficiently different to justify completely different educational theories. Many developmental psychologists say that it might be socially profitable to test for and target temperaments with special curricula.

Some of the Myers-Briggs temperaments are known to despise educational material that lacks theory. Therefore, effective curricula need to raise and answer "which" and "why" questions, to teach students with "intuitive" (Myers-Briggs) modalities.

Philosophers identify independent, logical reasoning as a precondition to most western science, engineering, economic and political theory. Therefore, every educational program that desires to improve students' outcomes in political, health and economic behavior should include a Socratically taught set of classes to teach logic and critical thinking.

www.numerons.in

Substantial resources and time can be saved by permitting students to test out of classes. This also increases motivation, directs individual study, and reduces boredom and disciplinary problems.

To support inexpensive continuing adult education a community needs a free public library. It can start modestly as shelves in an attended shop or government building, with donated books. Attendants are essential to protect the books from vandalism. Adult education repays itself many times over by providing direct opportunity to adults. Free libraries are also powerful resources for schools and businesses.

www.numerons.in

A notable reform of the education system of Massachusetts occurred in 1993.

The current student voice effort echoes past school reform initiatives focusing on parent involvement, community involvement, and other forms of participation in schools. However, it is finding a significant amount of success in schools because of the inherent differences: student voice is central to the daily schooling experience because students spend all day there. Many educators today strive for meaningful student involvement in their classrooms, while school administrators, school board members, and elected officials each lurch to hear what students have to say.

Positive education

Positive education is an approach to education that draws on positive psychology's emphasis of individual strengths and personal motivation to promote learning. Unlike traditional school approaches in which teachers attempt to tailor their material to a mythical "average" student, and move the class altogether using the material through one teaching and testing style, positive schooling teachers use techniques that focus on the well-being of individual students. Teachers use methods such as developing tailored goals for each student to engender learning and working with them to develop the plans and motivation to reach their goals. Rather than pushing students to achieve at a set grade level, seen through the emphasis of standardized testing, this approach attempts to customize learning goals to individual students' levels. Instead of setting students to compete against one another, learning is viewed as a cooperative process where teachers learn to respect their students and each student's input is valued.

www.numerons.in

Theoretical approaches

Several early psychologists and thinkers paved the way for the incorporation of positive psychology techniques, though they may not have yet been labeled as such, in the classroom. John Dewey was among the earliest advocates to impact the field of positive schooling. John Dewey recognized schools as primary institutions for the development of democracy. He opposed the repressive atmosphere of schools, especially elementary and secondary schools, and emphasized the importance of promoting learners' ability to absorb and recreate information in their minds. He put forth the idea of constructivism, which argues that individual learners should take information and creatively construct it

according to their own personal capacities and views. This approach opposes the traditional view of education in which teachers pass down knowledge to the students through direct communication. In summary, Dewey's view of education, similar to progressive education implies that people learn best in environments that are applicable to the real world and that allow them to learn through activities and practical problem solving.

Maria Montessori, the originator of the Montessori system, put forth views relating to positive schooling as well. The Montessori system is largely based on the positive psychology principle of creativity. Creativity, known as one of the twenty-four character strengths, is offered with the freedom for children to choose how they learn, known as self-directed learning. Children are provided with hands-on materials, which not only inspires creativity, but also stimulates interest in learning, as children are able to express themselves through learning, rather than feeling forced to work in order to learn.

Elizabeth Hurlock was one of the first psychologists to actually carry out experiments with positive psychology techniques to measure the effects of positive schooling in the field of education. Hurlock studied the effectiveness of praise and reproach in the classroom, arguing that praise was a more effective long-term incentive. Her studies found that praise was more effective for children regardless of age, ability and gender.

Jeniffer Henderlong and Mark Lepper echo Hurlock's arguments that praise is beneficial to enhancing children's intrinsic motivation. Although some research doubts the effectiveness of praise, appropriate use of praise is proven to be positively correlated with confidence and better academic performance results. They support that praise increases the personal beliefs about one's ability to perform given tasks. Also, cognitive evaluation theory supports that praise enhances individuals' perception about performance outcomes and that positive moods induced by praise may contribute to effective outcomes.

Arthur Chickering and Zelda Gamson focus on the pedagogy, the teacher's "how," rather than content and subject matter being taught, which is partly due to the scarce empirical research that has been done on college curriculum. Chickering and Gamson give seven research-supported principles regarding education and learning in the undergraduate environment for teachers to follow. First, teachers are to encourage contact between students and faculty. Chickering and Gamson explain that student-faculty relationships give students motivation to keep working hard to strive for future goals and also provide support and resources. Second, to develop reciprocity and cooperation among students, promoting a collaborative learning environment, rather than a competitive one. This gives students opportunities to work together and learn from one another, which has been shown to strengthen understanding. Third, teachers are to use active learning techniques, relating material to topics that students already have an interest in and getting students to ask, "What does this concept look like in my own life?" Fourth, teachers are to give prompt feedback. Balancing assessment and feedback results in efficient learning, as students realize what they do and do not know and learn to assess themselves. Fifth, emphasizing time on task, or sharing effective time management strategies to give students an understanding for their time expectations. Sixth, communicating high expectations has

shown to be very successful. Expectations that teachers implement give students a gage for how much potential they think that they have. Lastly, respecting students' diverse talents and ways of learning accounts for all learning styles and allows students to figure out how they learn best.

Eliot Aronson has pioneered the jigsaw classroom, a theoretical approach for 3rd-12th grade classes which emphasizes the individual academic strengths of children and seeks to make them peer-teachers in a cooperative learning setting. In this approach, students are divided into competency groups of four to six students; individual group members then break off and work with "experts" on their topic from the other groups, researching together that specific section of material. These students then return to their groups and present on their part of the material. This approach encourages group engagement, listening, and cooperation among peers, as well as incorporates an aspects of play into learning. It as shown positive effects on academic performance and liking for school and peers. This may be because increased liking leads to self-esteem, which if absent, can effect academic performance. It is also possible that jigsaw methods help to increase participation while reducing anxiety, lead to increases empathy, and result in changes in attributions of success and failures. The Jigsaw method has been proposed as a strategy to improve race relations since it meets the criteria posed by contact theory for reducing racial prejudice. Intergroup contact theory states that interracial contact will only improve race relations if ethnic groups are of equal status, pursue a common goal of mutual interest for groups, and are sanctioned by institutions.

www.numerons.in

Another model that utilizes positive education in school is the response to intervention model. Response to intervention is a preventative model that works to provide tailored assistance to at-risk students who are exhibiting insufficient academic achievement, though its principles have been used to address behavioral issues as well. The central components of this model include a core curriculum based on scientific evidence, universal screening, progress monitoring, and decisions about acceptable progress in subsequent tiers. RTI utilizes a multi-tiered structure: at each tier, students are screened and then monitored. The model was originally created to help identify learning disabilities, so that the adoption of a core curriculum ensures that inadequate teaching is not the cause for poor performance. Those who struggle even when adhering to a research-supported curriculum are given more intense instruction at a higher tier. When behavior is being considered, school or local norms for behavior rates are used when screening.

The Positive Behavioral Support (PBS) model is structured similarly to RTI but addresses behavior problems. This model adopts a prevention and intervention approach, emphasizing the importance of building prosocial skills, in addition to reducing bad behavior while implementing a three-tiered "continuum of supports" from a universal to an individual level. The strategies at the universal level include defined expected behaviors, strategies to teach expected behavior, strategies to encourage and practice appropriate behavior, and consistency within and across school systems. The second level involves providing targeted support for individuals and groups that are at risk. The final level concerns individuals that persist in their bad behavior and involves functional behavior assessments, instruction-based plans, and collective comprehensive plans including

www.numerons.in

families and community agencies. PBS can be implemented at a school-wide, district-wide or even state-wide level. Recently, local school systems and even state departments of education have been demonstrating a rising interest in PBS because the program requires little training time and limited money and staff. In 2002, the New Hampshire Department of Education organized a state-wide initiative to introduce PBS into New Hampshire schools. PBS has also become popular in Maryland, as more than 33% of state's schools implemented the program in 2006.

www.numerons.in

Empirical findings

One major empirical finding in support for positive learning techniques has been the positive effect of praise-based discipline techniques in classrooms. Elizabeth Hurlock studied the day-to-day improvement of students who were praised, reproached, and ignored. Students were divided into these groups in addition to a control group after they had been administered an arithmetic test, and were subsequently tested each day over a additional period of four days. After the first testing session, the control group was tested in a separate room from the other groups. In the treatment room, the "praise" group of students were invited to the front of the room and praised for their work as well as encouraged to do better. The "reproach" group was called up and reproved for their poor performance, while the ignored group received no recognition. Some significant findings include the fact that the praised group experienced the most initial improvement, followed by the reproach group and then the ignored group, while no improvement was seen in the control group. The ignored and control group also showed a decrease in accuracy towards the end of the testing period. When children were grouped according to academic achievement into the categories "superior", "average" and "inferior" after the first test, praise was the most influential incentive for all students, though it was most effective for the "inferior" group. As a whole, the results suggested that praise was the most accurate incentive regardless of age, sex, initial ability, or accuracy.

www.numerons.in

While empirical evidence supports the positive effects of praise, there exists a debate regarding whether the Jigsaw classroom method is successful in various areas. Two studies by Christopher Bratt, who was interested in the Jigsaw classroom's ability to improve prejudice based on ethnicity, examined the effects of the jigsaw classroom method on intergroup relations; yet, no positive effects were found. The first studied the method's effect on majority members' outgroup attitudes, attitudes towards school empathy, and intergroup friendships by examining two jigsaw classrooms and two regular classrooms of multi-ethnic 6th graders. The second measured common ingroup identity in the majority sample and outgroup attitudes in the minority sample in addition to the previous variables in a sample of 8th-10th graders in 46 multi-ethnic classrooms, utilizing a matched pair design between jigsaw and regular classrooms. No evidence of any significant effects of the jigsaw method was found in the second study, while outgroup attitudes improved in study 1. Yet, Bratt believed the findings from study 1 were spurious, arguing that the fact that one of the classrooms in study 1 was taught by two teachers while the others had one teacher may have influenced the results.

www.numerons.in

A study by Walker & Crogan yielded evidence that supported the utility of the jigsaw classroom. The study investigated the relationship between teaching methods such as cooperative learning and the jigsaw classroom and outcomes in academic performance, self-esteem, attitude of school, attitude of peers, and racial prejudice. The study was designed to investigate solely the jigsaw classroom method, yet one of the teachers altered her mode of instruction due to the behavior of disruptive students so that it resembled cooperative learning. As a result, the experimenters modified their objectives, believing they could compare the effectiveness of cooperation, necessary in both methods, and task interdependence, characteristics only of the jigsaw classroom. They concluded that academic performance, liking of peers, and racial prejudice improved under the jigsaw classroom method while cooperative learning appeared to intensify intergroup tension, yet major methodological issues may cast doubt on the validity of these findings. Many of the classrooms did not adhere very strictly to proper plan for implementation of the jigsaw classroom and the researchers had to abandon their original design. Also, the fact that one of the teachers had to forgo the jigsaw classroom method due to student misbehavior is telling. Bratt argues that studies professing results that support improved intergroup relations are similarly flawed.

www.numerons.in

The Circle of Courage curriculum is, yet, another practical attempt for implementing positive learning techniques. Deborah Espiner and Diane Guild monitor the progress and success of Mt. Richmond Special School after implementing the Circle of Courage curriculum and Response Ability Pathways (RAP) program. The Circle of Courage is an educational philosophy based on Native American values. Belonging, mastery, independence, and generosity are four core values that are intended to integrate Western and indigenous cultures. The school managers established a positive learning environment based on these two programs, which were designed for dynamic interaction between teachers and students. Before launching the actual classroom environment, five months were taken to introduce new learning methods to school staff and students. In general, participants acknowledged that new modules brought positive impact in the school. One recognizable outcome was that RAP training facilitated the connection between teachers and challenging students. Additionally, new positive education methods also led teachers to discover the potentials of their pupils.

www.numerons.in

When examining programs that attempt to help children overcome behavioral issues that prevent them from displaying their full potential, research has provided support for the efficacy of PBS. A study by Barrett and Lewis-Palmer investigated the state-wide implementation of PBS in 467 schools. The results indicated that overall, the program had been successfully implemented and displayed high fidelity to the theoretical model. Elementary schools reported 43% less office discipline referrals (ODRs) per day, while middle schools reported 37% less ODRs per day and K-(8-12) schools reported 72% less ODRs per day when compared with the national averages. Schools also demonstrated significant reductions in suspension rates in as little as one year. Another study by Muscott and Mann examined the first cohort of 28 New Hampshire early childhood education programs and K-12 schools that had implemented PBS in accordance with the directive of the Department of Education. Within three months after the program was introduced, 54% of schools met the standards of successful PBS implementation and 88% of schools had

www.numerons.in

done so two years after implementation. In terms of behavior issues, a school was considered successful if 80-90% of elementary students and 70-80 middle school students received less than 2 ODRs during a school year. After the first year, 70% of schools has achieved these results. Between the first and second years, the schools reduced ODRs by 28% collectively.

Controversies

www.numerons.in

Positive education is, by no means, uniformly agreed on as an effective teaching strategy. The No Child Left Behind Act (NCLB) was proposed in 2001 to improve the conditions of public schools in the United States. The act has imposed standardized testing on all schools that are government-run and receive government funding. Each school's test results are analyzed, and schools with continuously low test scores are obligated to develop an improvement plan. There is still much debate whether the act has a positive effect on America's education system, since it is based on performance-based education reform. Supporters of the act believe that setting measurable goals will improve individual educational success and that statewide tests will improve the situation of public schools. Major teacher's unions and other opponents, however, have doubts about the act's effectiveness, which may be due to the mixed results of NCLB, arguing over the ineffectiveness of standardized tests and higher standards for teacher qualification. Opponents also argue that standardized tests are exceedingly biased and that higher standards for teacher qualification simply contribute to teacher shortage.

Similarly, the 2009 United States Department of Education program Race to the Top, designed to spur reform in K-12 Education, and awarding $4.35 billion in funds, has been controversial for its emphasis on testing to evaluate schools, an approach which contrasts positive schooling techniques, and data regarding its effectiveness has yet to be produced.

Besides the emphasis on standardized testing to evaluate school performance, tracking has been a very controversial, yet widely implemented, approach to learning in America's public schools. Tracking is an approach which places children in classes according to expectation levels. Honors, college-preparation, Advanced Placement, and International Baccalaureate classes are examples of higher-level learning courses, while schools may simultaneously offer regular-level classes for other students. Research has shown a disparity in the enrollment of these classes based on race. Research also shows that while separation by tracking is beneficial for higher-level students, it produces no benefit for lower-level students, and is possibly even detrimental to their academic success. Many advocates for education reform discount tracking based on the argument that a rigorous, quality education should be provided universally through public schools.

Applications

www.numerons.in

Recently, a positive psychology plan was implemented in the U.S. Military to address the high rates of post-traumatic stress disorder, depression, and other mental disorders among soldiers. The military asked psychologists to devise some sort of way not simply to treat the problem but to prevent future soldiers from becoming vulnerable to these mental

disorders. Statistically, there is a normal distribution of reactions to combat in the military: the left side includes those who have trouble and end up suffering from a mental disorder, the middle, those who are resilient and return to normal functioning afterwards, and the right are those who bounce back to an even higher level of functioning and experience growth through adversity. The goal of the plan is to have a negatively skewed distribution that shifts most soldiers to the right side of this distribution. The model is designed to improve one's spiritual, emotional, social, and family fitness. If the plan is successful within the military, it could possibly revolutionize current U.S. civilian health care and be a new model for the education system. Within health care, it will emphasize prevention, rather than solely treatment; additionally, within schools, it will encourage psychological fitness similar to the plan used for the military.

www.numerons.in

Additionally, the effects of positive learning were examined in the context of medical school and first-year physicians. Often, medical students and young physicians get exhausted and burnt out from the stressful conditions they operate under. Medical students at Karolinska Institutet were evaluated in their final year of school and again in their first year as a physician. After controlling for baseline exhaustion, a positive learning climate in the clinic that the students were working in was found to have a negative correlation with exhaustion. In this case, positive learning was found to predict the exhaustion of students and new doctors. Although only a correlation, positive learning environments could benefit the well-being of people with various other careers and job conditions.

Conclusion

www.numerons.in

Positive education, the use of positive psychology in the realm of education, may have the potential to be a new model for successful education. The field of positive schooling, although still in the early stages of development, seems to have a promising future. Rather than the traditional concept of teachers simply communicating information to students, students in positive schooling learn through individual goals and by cooperating with other students to have an environment in which students can work towards the same goal together. Overall, the goal of positive schooling is to turn all students into teachers who will pass down their wisdom and knowledge to others and teachers who will continue the ways of positive education.

Progressive education

Educational progressivism is the belief that education must be based on the principle that humans are social animals who learn best in real-life activities with other people. Most progressive educators believe that children learn as if they were scientists, following a process similar to John Dewey's model of learning:

www.numerons.in

- Become aware of the problem.
- Define the problem.
- Propose hypotheses to solve it.
- Evaluate the consequences of the hypotheses from one's past experience.

- Test the likeliest solution.

Given this view of human nature, a progressivist teacher desires to provide not just reading and drill, but also real-world experiences and activities that center on the real life of the students. Typical progressivist slogans are "Learn by Doing!" and "Learn by Discovery."

Philosophy

www.numerons.in

Progressive education is a pedagogical movement that began in the late nineteenth century and has persisted in various forms to the present. More recently, it has been viewed as an alternative to the test-oriented instruction legislated by the No Child Left Behind educational funding act.

The term "progressive" was engaged to distinguish this education from the traditional curriculum of the 19th century, which was rooted in classical preparation for the university and strongly differentiated by socioeconomic level. By contrast, progressive education finds its roots in present experience. Most progressive education programs have these qualities in common:

- Emphasis on learning by doing – hands-on projects, expeditionary learning, experiential learning
- Integrated curriculum focused on thematic units
- Strong emphasis on problem solving and critical thinking
- Group work and development of social skills
- Understanding and action as the goals of learning as opposed to rote knowledge
- Collaborative and cooperative learning projects
- Education for social responsibility and democracy
- Integration of community service and service learning projects into the daily curriculum
- Selection of subject content by looking forward to ask what skills will be needed in future society
- De-emphasis on textbooks in favor of varied learning resources
- Emphasis on life-long learning and social skills
- Assessment by evaluation of child's projects and productions

Development in the United States

The most famous early practitioner of progressive education was Francis Parker; its best-known spokesperson was the philosopher John Dewey.

www.numerons.in

In 1875 Francis Parker became superintendent of schools in Quincy, Massachusetts after spending two years in Germany studying emerging educational trends on the continent. Parker was opposed to rote learning, believing that there was no value in knowledge without understanding. He argued instead schools should encourage and respect the child's creativity. Parker's Quincy System called for child-centered and experience-based learning. He replaced the traditional curriculum with integrated learning units based on core themes

related to the knowledge of different disciplines. He replaced traditional readers, spellers and grammar books with children's own writing, literature, and teacher prepared materials. In 1883 Parker left Massachusetts to become Principal of the Cook County Normal School in Chicago, a school also served to train teachers in Parker's methods. In 1894 Parker's Talks on Pedagogics, which drew heavily on the thinking of Fröbel, Pestalozzi and Herbart, became one of the first American writings on education to gain international fame.

www.numerons.in

That same year, philosopher John Dewey moved from the University of Michigan to the newly established University of Chicago where he became chair of the department of philosophy, psychology and education. He and his wife enrolled their children in Parker's school before founding their own school two years later.

Whereas Parker started with practice and then moved to theory, Dewey began with hypotheses and then devised methods and curricula to test them. By the time Dewey moved to Chicago at the age of thirty-five, he had already published two books on psychology and applied psychology. He had become dissatisfied with philosophy as pure speculation and was seeking ways to make philosophy directly relevant to practical issues. Moving away from an early interest in Hegel, Dewey proceeded to reject all forms of dualism and dichotomy in favor of a philosophy of experience as a series of unified wholes in which everything can be ultimately related.

In 1896, John Dewey opened what he called the laboratory school to test his theories and their sociological implications. With Dewey as the director and his wife as principal, the University of Chicago Laboratory school, was dedicated "to discover in administration, selection of subject-matter, methods of learning, teaching, and discipline, how a school could become a cooperative community while developing in individuals their own capacities and satisfy their own needs." (Cremin, 136) For Dewey the two key goals of developing a cooperative community and developing individuals' own capacities were not at odds; they were necessary to each other. This unity of purpose lies at the heart of the progressive education philosophy. In 1912, Dewey sent out students of his philosophy to found The Park School of Buffalo and The Park School of Baltimore to put it into practice. These schools operate to this day within a similar progressive approach.

www.numerons.in

At Columbia, Dewey worked with other educators such as Charles Eliot and Abraham Flexner to help bring progressivism into the mainstream of American education. In 1917 Columbia established the Lincoln School of Teachers College "as a laboratory for the working out of an elementary and secondary curriculum which shall eliminate obsolete material and endeavor to work up in usable form material adapted to the needs of modern living." (Cremin, 282) Based on Flexner's demand that the modern curriculum "include nothing for which an affirmative case can not be made out" (Cremin, 281) the new school organized its activities around four fundamental fields: science, industry, aesthetics and civics. The Lincoln School built its curriculum around "units of work" that reorganized traditional subject matter into forms embracing the development of children and the changing needs of adult life. The first and second grades carried on a study of community life in which they actually built a city. A third grade project growing out of the day to day

www.numerons.in

life of the nearby Hudson river became one of the most celebrated units of the school, a unit on boats, which under the guidance of its legendary teacher Miss Curtis, became an entrée into history, geography, reading, writing, arithmetic, science, art and literature. Each of the units was broadly enough conceived so that different children could concentrate on different aspects depending on their own interests and needs. Each of the units called for widely diverse student activities, and each sought to deal in depth with some critical aspect of contemporary civilization. Finally each unit engaged children working together cooperatively and also provided opportunities for individual research and exploration.

www.numerons.in

From 1919 to 1955 the Progressive Education Association founded by Stanwood Cobb and others worked to promote a more student-centered approach to education. During the Great Depression the organization conducted an Eight Year study evaluating the effects of progressive programs. More than 1500 students over four years were compared to an equal number of carefully matched students at conventional schools. When they reached college, the experimental students were found to equal or surpass traditionally educated students on all outcomes: grades, extracurricular participation, dropout rates, intellectual curiosity, and resourcefulness. Moreover, the study found that the more the school departed from the traditional college preparatory program, the better was the record of the graduates. (Kohn, Schools, 232)

By mid-century many public school programs had also adopted elements of progressive curriculum. At mid-century Dewey believed that progressive education had "not really penetrated and permeated the foundations of the educational institution."(Kohn, Schools, 6,7) As the influence of progressive pedagogy grew broader and more diffuse, practitioners began to vary their application of progressive principles. As varying interpretations and practices made evaluation of progressive reforms more difficult to assess, critics began to propose alternative approaches.

www.numerons.in

The seeds of the debate over progressive education can be seen in the differences of Parker and Dewey. These have to do with how much and by whom curriculum should be worked out from grade to grade, how much the child's emerging interests should determine classroom activities, the importance of child-centered vs. societal–centered learning, the relationship of community building to individual growth, and especially the relationship between emotion, thought and experience.

In 1955 the publication of Rudolf Flesch's Why Johnny Can't Read leveled criticism of reading programs at the progressive emphasis on reading in context. The conservative McCarthy era raised questions about the liberal ideas at the roots of the progressive reforms. The launching of Sputnik in 1957 at the height of the cold war gave rise to number of intellectually competitive approaches to disciplinary knowledge, such as BSCS biology PSSC physics, led by university professors such as Jerome Bruner and Jerrold Zacharias.

www.numerons.in

Interestingly, some of the cold war reforms incorporated elements of progressivism. For example, the work of Zacharias and Bruner was based in the developmental psychology of Jean Piaget and incorporated many of Dewey's ideas of experiential education. Bruner's analysis of developmental psychology became the core of a pedagogical movement known

as constructivism, which argues that the child is an active participant in making meaning and must be engaged in the progress of education for learning to be effective. This psychological approach has deep connections to the work of both Parker and Dewey and led to a resurgence of their ideas in second half of the century.

In 1963 President Johnson inaugurated the Great Society and the Elementary and Secondary Education Act suffused public school programs with funds for sweeping education reforms. At the same time the influx of federal funding also gave rise to demands for accountability and the behavioral objectives approach of Robert F. Mager and others foreshadowed the No Child Left Behind Act passed in 2002. Against these critics eloquent spokespersons stepped forward in defense of the progressive tradition. The Open Classroom movement, led by Herb Kohl and George Dennison, recalled many of Parker's child centered reforms. More recently Alfie Kohn has been an outspoken critic of the No Child Left Behind Act and a passionate defender of the progressive tradition.

www.numerons.in

Taxpayer revolts, leading to cuts in funding for public education in many states, have led to the founding of an unprecedented number of independent schools, many of which have progressive philosophies. The charter school movement has also spawned an increase in progressive programs. Most recently, public outcry against No Child Left Behind testing and teaching to the test has brought progressive education again into the limelight. Despite the variations that still exist among the progressive programs throughout the country, most progressive schools today are vitalized by these common practices:

- The curriculum is more flexible and is influenced by student interest
- Teachers are facilitators of learning who encourage students to use a wide variety of activities to learn
- Progressive teachers use a wider variety of materials allowing for individual and group research.
- Progressive teachers encourage students to learn by discovery
- Progressive education programs often include the use of community resources and encourage service-learning projects.

www.numerons.in

Education outside of schools

Organizations like the Boy Scouts of America rose, even amidst concerns by opponents of the progressive movement in the United States, because some people felt that social welfare of young men should be maintained through education alone. After decades of growing interest in and development of experiential education and scouting (not Scouting) in the United States, and the emergence of the Scout Movement in 1907, in 1910 Boy Scouts of America was founded in the merger of three older Scouting organizations: Boy Scouts of the United States, the National Scouts of America and the Peace Scouts of California. Its founder, Chicago publisher W. D. Boyce was visiting London, in 1909, when he met the Unknown Scout and learned of the Scouting movement. Soon after his return to the U.S., Boyce incorporated the Boy Scouts of America on February 8, 1910. Edgar M. Robinson and Lee F. Hanmer became interested in the nascent BSA program and convinced Boyce to turn the program over to the YMCA for development. Robinson enlisted Ernest Thompson

www.numerons.in

Seton, Daniel Carter Beard and other prominent leaders in the early youth movements. After initial development, Robinson turned the movement over to James E. West who became the first Chief Scout Executive and the Scouting movement began to expand in the U.S. As BSA grew, it absorbed other Scouting organizations.

Recent developments

Changes in educational establishments came about as Americans and Europeans felt they had fallen behind the Soviet Union technologically after the success of Sputnik in October, 1957. A rethinking of education theory followed that, together with the prevailing conservative political climate, helped to cause progressivism to fall from favor.

www.numerons.in

However, today many schools use progressive education methods, such as hands on activities and science experiments in Junior High Schools. Numerous schools also self-identify as progressive in educational philosophy.

Constructionism (learning theory)

Constructionist learning is inspired by the constructivist theory that individual learners construct mental models to understand the world around them. However, constructionism holds that learning can happen most effectively when people are also active in making tangible objects in the real world. In this sense, constructionism is connected with experiential learning and builds on some of the ideas of Jean Piaget.

www.numerons.in

Seymour Papert defined constructionism in a proposal to the National Science Foundation entitled Constructionism: A New Opportunity for Elementary Science Education as follows: "The word constructionism is a mnemonic for two aspects of the theory of science education underlying this project. From constructivist theories of psychology we take a view of learning as a reconstruction rather than as a transmission of knowledge. Then we extend the idea of manipulative materials to the idea that learning is most effective when part of an activity the learner experiences as constructing a meaningful product."

As Papert and Idit Harel say at the start of Situating Constructionism, "It is easy enough to formulate simple catchy versions of the idea of constructionism; for example, thinking of it as 'learning-by-making'. One purpose of this introductory chapter is to orient the reader toward using the diversity in the volume to elaborate—to construct—a sense of constructionism much richer and more multifaceted, and very much deeper in its implications, than could be conveyed by any such formula."

www.numerons.in

Papert's ideas became well-known through the publication of his seminal book Mindstorms: Children, Computers, and Powerful Ideas (Basic Books, 1980). Papert described children creating programs in the Logo language. He likened their learning to a living in a "mathland," where learning mathematical ideas is as natural as learning French while living in France.

Papert has been a huge proponent of bringing IT to classrooms, as in his early uses of the Logo language to teach mathematics to children. Constructionist learning involves students drawing their own conclusions through creative experimentation and the making of social objects. The constructionist teacher takes on a mediational role rather than adopting an instructionist position. Teaching "at" students is replaced by assisting them to understand—and help one another to understand—problems in a hands-on way.

While constructionism has, due to its impetus, been primarily used in science and mathematics teaching (in the form of inquiry-based science), it is arguable that it developed in a different form in the field of media studies in which students often engage with media theory and practice simultaneously, in a complementary praxis. More recently it has gained a foot hold in Applied linguistics, in the field of second language acquisition (or SLA). One such application has been the use of the popular game SimCity as a means of teaching English using constructionist techniques (Gromik:2004).

Begininning in the 1980s, The LEGO Group funded research in Papert's research group at the MIT Media Laboratory, which at the time was known as the "Epistemology and Learning Group." When LEGO launched its LEGO Mindstorms Robotics Invention System in 1998, which was based on work in his group, they received permission to use the moniker "Mindstorms" from Seymour's 1980 book title. In The LEGO Group's LEGO Serious Play project, business people learn to express corporate issues and identity through the medium of plastic bricks -- another form of constructionist learning.

In 2005, Papert, together with Nicholas Negroponte and Alan Kay launched the One Laptop Per Child initiative to put constructionist learning into practice in the developing world. The aim is to provide $100 laptops to every child in the developing world.

Constructionist learning have also been put into practice by the World Wide Workshop Foundation. With Papert as an advisor, the foundation established the Globaloria program in 2006 to teach youth to become game and simulation makers using constructionist learning principles.

Computer programming languages

A number of programming languages have been created, wholly or in part, for educational use, to support the constructionist approach to learning. These languages have been dynamically typed, and reflective. They include:

- Logo is a multi-paradigm language, which is an easier-to-read adaptation and dialect of Lisp, without the parentheses. Logo is known for its introduction of turtle graphics to elementary schoolchildren in the 1980s. Its creators were Wally Feurzeig, and Papert.
- Smalltalk is an object-oriented language that was designed and created at Xerox PARC by a team led by Alan Kay.

www.numerons.in

- Etoys is being developed since the 1990s under the direction of Alan Kay, most recently by the Viewpoints Research Institute, based on Morphic tile scripting. Etoys was initially targeted at primary school math and science education.
- Scratch was developed in the early 21st century at MIT Media Lab under Mitchel Resnick. Like Etoys, it is based on Morphic tile scripts. Scratch is initially targeted at programming interactive multimedia, in primary and secondary education.
- StarLogo TNG was developed by the MIT Scheller Teacher Education Program under Eric Klopfer. It combines a block programming interface with compelling 3D graphics. It is targeted at programming games and game-like simulations in middle and secondary schools.

www.numerons.in

Democratic education

Democratic education is a theory of learning and school governance in which students and staff participate freely and equally in a school democracy. In a democratic school, there is typically shared decision-making among students and staff on matters concerning living, working, and learning together.

History

The first major writer to discuss a nascent theory of democratic education was Leo Tolstoy who operated his own democratic school for peasant children in Yasnaya Polyana, Russia in the late 19th century.

www.numerons.in

“Don't be afraid! There will be Latin and rhetoric, and they will exist in another hundred years, simply because the medicine is bought, so we must drink it (as a patient said). I doubt whether the thoughts which I have expressed perhaps indistinctly, awkwardly, inconclusively, will become generally accepted in another hundred years; it is not likely that within a hundred years all those ready-made institutions-schools, gymnasia, and universities -- will die, and that within that time there will grow freely formed institutions, having for their basis the freedom of the learning generation.”

— "Education and Instruction," Leo Tolstoy, 1860.

The primary theorist, however, of what developed into democratic education is John Dewey. His works on the relationship between democracy and education became foundational literature for the broader progressive education movement.

The oldest existing democratic school is the Summerhill School in Suffolk, England founded in 1921. A.S. Neill, its founder, wrote a number of books that now define much of contemporary democratic education theory. Following a critical government inspection in 1999 the then Secretary of State for Education and Employment, David Blunkett issued the school with a 'notice of complaint' over its policy of non-compulsory lessons, a procedure which would usually have led to closure; Summerhill chose to contest the notice which went before a special educational tribunal in the Royal Courts of Justice in London with the

www.numerons.in

school being represented by a noted human rights lawyer, Geoffrey Robertson QC. The government's case soon collapsed and a settlement was offered. This offer was discussed and agreed at a formal school meeting which had been hastily convened in the courtroom from a quorum of pupils and teachers who were present in court. The settlement was much broader than could have been decided on the judge's authority alone as it made provision for Summerhill to be inspected using unique criteria in future which would take account of its special educational philosophy.

www.numerons.in

Sudbury Valley School, a democratic school founded in Framingham, Massachusetts, United States in 1968, continues to be the model practiced by dozens of Sudbury schools around the world. Certain facets of the Sudbury model separate it from other schools that refer to themselves as "democratic schools" or "free schools." The following features apply to the Sudbury Valley School, see: de-emphasis of classes, age mixing, autonomous democracy, order and discipline, values education, evaluation, the role of adults, diplomas, pluralism and political neutrality, the existence of rules of order, the rule of law, universal suffrage, protecting the rights of individuals.

The Albany Free School was established in Albany, NY in 1969 and still operates today. The Albany Free School's founder, Mary Leue, corresponded with Summerhill founder A.S. Neill about her plan to take his experiment of radical freedoms to a different demographic: the inner city. Leue went on to create The Free School in Albany's urban south end with the idea of making these freedoms and democratic principles accessible to children of the poor.

www.numerons.in

The SchuelerInnenschule, a democratic middle school serving children between the ages of 9 and 19, in Vienna, Austria was founded in 1979 by a small group of parents wanting something different for their children and wanting to follow in the footsteps of the Glockseeschule in Hannover, Germany. At about the same time two ground schools, the Free School of Hofmuehlgasse and the Schulkollektive in WUK, were founded also using the same basic education models. All three of these school are the oldest democratic schools still in existence in Austria.

Since 1993 there has been an International Democratic Education Conference (IDEC) which is held in a different country each year. In 2008, the first EUDEC (European Democratic Education Conference) was held in Leipzig, Germany.

Practice

Pedagogy

www.numerons.in

Democratic schools do not have compulsory uniform curricula. Instead, these schools place emphasis on learning as a natural product of all human activity. They assume that the free market of ideas, free conversation, and the interplay of people provide sufficient exposure to any area that may prove relevant and interesting to individual students. Students of all ages learn together; older students learn from younger students as well as vice versa. Students of different ages often mentor each other in social skills.

In democratic schools, students are given responsibility for their own education. There is no pressure, implicitly nor explicitly, on students by staff to learn anything in particular. Students are given the right and responsibility to choose what to do with their time and attention.

Because the curricula are different for each student, democratic schools do not compare or rank students. There are no compulsory tests aside from those that individual governments require and those that colleges require for admission.

www.numerons.in

Some schools — mostly in the United States — offer a graduation procedure for those who wish to receive a high school diploma. Students who choose to use this option often must present a thesis on how they have prepared themselves for adulthood.

A striking feature of democratic schools is the ubiquity of play. Students of all ages — but especially the younger ones — often spend most of their time either in free play, or playing games (electronic or otherwise). No attempt is made to limit, control or direct the play — it is seen as activity every bit as worthy as academic pursuits, often even more valuable. Play is considered essential for learning, particularly in fostering creativity. The pervasiveness of play has led to a recurring observation by first-time visitors to a democratic school that the students appear to be in perpetual "recess".

Governance

The primary system of governance in a democratic school is a form of direct democracy similar to the New England town meeting. Often, all aspects of governing a democratic school are determined in school meetings. School meetings pass, amend, and repeal school rules, manage the school's budget, and decide on hiring and firing of staff. Each individual present — whether student or staff — has one vote and most decisions are made by simple majority.

www.numerons.in

Oftentimes, various aspects of school administration are delegated to parties selected during school meetings. These may include elected administrative clerks (who may be elected from staff or students) and committees of volunteers.

School rules are normally compiled in a law book, updated repeatedly over time, which forms the school's code of law. If a school member commits an infraction, for example by harassing or hurting another member, or by mismanaging a delegated responsibility, the problem is dealt with through the school's judicial system organized by school members. Usually, there is a set procedure to handle complaints, and most of the schools follow guidelines that respect the idea of due process of law. There are usually rules requiring an investigation, a hearing, a trial, a sentence, and allowing for an appeal.

www.numerons.in

Theory

There is no unified body of literature that spans multiple disciplines in academia on the subject of democratic education. However, there are a variety of spheres of theory that

address various elements of democratic education. The goals of democratic education vary according to the participants, the location, and access to resources. Because of this, there is no one widely agreed upon definition.

Political

As a curricular, administrative and social operation within schools, democratic education is essentially concerned with equipping people to make "real choices about fundamental aspects of their lives" and happens within and for democracy. It "is a process where teachers and students work collaboratively to reconstruct curriculum to include everyone." In at least one conception, democratic education teaches students "to participate in consciously reproducing their society, and conscious social reproduction." This role necessitates democratic education happening in a variety of settings and being taught by a variety of people, including "parents, teachers, public officials, and ordinary citizens." Because of this "democratic education begins not only with children who are to be taught but also with citizens who are to be their teachers." Another definition is noted for its controversy because it views democractic education as "an education that democratizes learning itself."

There are a variety of components involved in democratic education. One author identifies those elements as being a problem-solving curriculum, inclusivity and rights, equal participation in decision-making, and equal encouragement for success. The Institute for Democratic Education identifies the principles of democratic education as,

- The interaction between democratic philosophy and education,
- Pluralistic education,
- School administration by means of democratic procedures,
- Education based on respect for human rights,
- Dialogic evaluation,
- Dialogic relationships, and
- Critical social thinking.

The "strongest, political rationale" for democratic education is that it teaches "the virtues of democratic deliberation for the sake of future citizenship." This type of education is often alluded to in the deliberative democracy literature as fulfilling the necessary and fundamental social and institutional changes necessary to develop a democracy that involves intensive participation in group decision making, negotiation, and social life of consequence.

The type of political socialization that takes place in democratic schools is strongly related to deliberative democracy theory. Claus Offe and Ulrich Preuss, two theorists of the political culture of deliberative democracies argue that in its cultural production deliberative democracy requires “an open-ended and continuous learning process in which the roles of both ‘teacher’ and ‘curriculum’ are missing. In other words, what is to be learned is a matter that we must settle in the process of learning itself."

The political culture of a deliberative democracy and its institutions, they argue, would facilitate more "dialogical forms of making one's voice heard" which would "be achieved within a framework of liberty, within which paternalism is replaced by autonomously adopted self-paternalism, and technocratic elitism by the competent and self-conscious judgment of citizens."

Edward Portis offers a critique of what he terms 'democratic education' but his use of this term can be better understood as civic education. Portis contends, as many democratic education practitioners and theorists would, that a compulsory curriculum that claims to imbue in its students 'democratic virtues' actually does exactly the opposite. Portis argues that because politics and popular rule is rooted in the public deliberation of competing ideas and conceptions of social life, to pretend that certain values can be taught in the traditional sense—through mass compulsory education—subverts the democratic nature of the process. There is no such thing as a 'proper' education for democracy in this sense.

Democratic education theorists of the sort whose work underpin democratic schools, rather than those who analyze something akin to civic education (see Gutmann, et al.) would fundamentally agree that democratic values cannot be taught in the traditional sense. If children are to ever learn how to be citizens of a democracy, they must participate in a democracy (see Greenberg 1992). This argument conforms to the cognition-in-context research by Lave below.

In addition, this argument converges with various literatures concerning student voice, youth participation and other elements of youth empowerment.

www.numerons.in

Cultural

One of the first theorists and practitioners of democratic education was the novelist Leo Tolstoy who founded a school for peasant children in Russia.

The most prominent theorist to voice what has become a common justification for uniform, mass-education and critiqued Tolstoy's philosophy, was Émile Durkheim in his lectures at the Sorbonne in 1902-03. Durkheim was the father of modern sociology and developed the sociological/anthropological school of Functionalism. These lectures have since been published under the title Moral Education.

Durkheim argued that the transition from primitive to modern societies occurred in part as 'elders' made a conscious decision to transmit what were deemed the most essential elements of their culture to the following generations. In Moral Education, Durkheim makes the case for an education system that preserves social solidarity by instilling three principles of 'secular morality' in children: what he terms a spirit of discipline, attachment to social groups, and self-determination. In the process of arguing how to instill these principles, he makes an extended argument on how punishment should be used in the schools. In this section, Durkheim described Tolstoy's theory as an example of a philosophy of education that doesn't seem to use punishment as a mechanism of cultural solidarity formation and transmission:

According to Tolstoy, the model of ideal education is that which occurs when people go on their own initiative to discover things in museums, libraries, laboratories, meetings, public lectures, or simply talk with wise men. In all these cases, there is no constraint exercised; yet do we not learn in this way? Why can't the child enjoy the same liberty? It is then only a matter of putting at his disposal that knowledge deemed useful to him; but we must simply offer it to him without forcing him to absorb it. If such knowledge is truly useful to him, he will feel its necessity and come to seek it himself. This is why punishment is unknown at the school of Iasnaia Poliana. Children come when they wish, learn what they wish, work as they wish.

www.numerons.in

He then argues that, in fact, punishment is found even in this type of system through subtle mechanisms of social behavior. It should not surprise any students of Durkheim to see how he argues for a social/cultural rather than an individual/rational explanation for punishment and self-regulation:

If the child misbehaves by destroying his playthings…the misbehavior is not that he has thoughtlessly and rather stupidly denied himself a way of entertaining himself; rather, it consists in his being insensitive to the general rule that prohibits useless destruction… Only disapproval can warn him that not only was the conduct nonsensical but that it was bad conduct violating a rule that should be obeyed. The true sanction, like the true natural consequence, is blame.

Durkheim touches on a point later made by democratic education writer George Dennison in The Lives of Children: much social regulation that exists in free society takes place in the course of maintaining our relationships with each other. Our desire to cultivate friendships, engender respect, and maintain what Dennison terms 'natural authority' encourages us to act in socially acceptable ways (i.e. culturally informed practices of fairness, honesty, congeniality, etc.):

www.numerons.in

The children will feel closer to the adults, more secure, more assured of concern and individual care. Too, their self-interest will lead them into positive relations with the natural authority of adults, and this is much to be desired, for natural authority is a far cry from authority that is merely arbitrary. Its attributes are obvious: adults are larger, are experienced, possess more words, have entered into prior agreements among themselves. When all this takes on a positive instead of a merely negative character, the children see the adults as protectors and as sources of certitude, approval, novelty, skills. In the fact that adults have entered into prior agreements, children intuit a seriousness and a web of relations in the life that surrounds them. If it is a bit mysterious, it is also impressive and somewhat attractive; they see it quite correctly as the way of the world, and they are not indifferent to its benefits and demands.

www.numerons.in

Durkheim, however, uses this point in the service of an argument for social facts to be communicated through the authority of teachers in traditional formal schools rather than through the 'natural' social relations of democratic life. In fact, he continues his argument

on the role of punishment, even the history of corporeal punishment, by demonstrating that it is the product of modern mass-education systems.

Punishment has not always been utilized to 'teach' the right ways of being a member of society. In fact Durkheim cites a number of ethnographies of various hunter-gatherer groups in demonstrating that 'primitive' societies in fact effectively socialized their children without the use of punishment in formal education systems. This evidence has since been confirmed and expanded.

www.numerons.in

Durkheim's ultimate point is that modern societies are so complex—so much more complex than primitive hunter-gatherer societies—and the roles individuals must fill in society are so varied that formal mass-education is necessary to instill social solidarity and what he terms 'secular morality'.

True education begins only when the moral and intellectual culture acquired by man has become complex and plays too important a part in the whole of the common life to leave its transmission from one generation to the next to the hazards of circumstance. Hence, the elders feel the need to intervene, to bring about themselves the transmission of culture by epitomizing their experiences and deliberately passing on ideas, sentiments, and knowledge from their minds to those of the young.

The dawn of civilization coincided with the dawn of a self-conscious reproduction of social values deemed necessary or essential for social solidarity:

www.numerons.in

In a word, civilization has necessarily somewhat darkened the child's life, rather than drawing him spontaneously to instruction as Tolstoy claimed. If, further, one reflects that at this point in history violence was common, that it did not seem to affront anyone's conscience, and that it alone had the necessary efficacy for influencing rougher natures, then one can easily explain how the beginnings of culture were signaled by the appearance of corporeal punishment.

Michel Foucault took up the issue of corporeal punishment in his famous works on 'total institutions.' In Discipline and Punish, focusing primarily on prisons but including modern schools, Foucault described the transformation of violence since the Enlightenment from a public spectacle to something much more subtle and insidious. Foucault argues that modern schools are used to transmit ideas to the young by claiming a privileged position to declare what is true, normal, and healthy. Rather than resorting to the violence that Durkheim detailed since the dawn of modern mass-education, Foucault argues that corporeal punishment has simply been replaced by forces much more difficult to notice than the force of blows and the whip of belts.

www.numerons.in

Democratic schools attempt to avoid any form of overt or covert enculturation outside the democratic process. Recognizing that one's 'natural authority' in the eyes of children is ultimately dependent on one's authenticity, teachers at democratic schools avoid tricks and enticements to induce any learning that isn't requested or desired. The only socialization that takes place explicitly is that recognized by the process of democratic deliberation. The

fact that a group of individuals—students and staff—must live, learn, and work together in the same space requires a system of governance. That system, as is the case in most countries and communities that respect principles of human equality, freedom, and the pursuit of happiness, is a form of direct democracy.

Cognitive

The 'practice theory' movement came at a time when there was also a renewed interest in child development and a refining of the theories of Jean Piaget, the foundational child psychologist. Although it is adduced that Piaget was mistaken. The experience of Sudbury model schools showing that a great variety can be found in the minds of children, against Piaget's theory of universal steps in comprehension and general patterns in the acquisition of knowledge: "No two kids ever take the same path. Few are remotely similar. Each child is so unique, so exceptional."

Jean Lave was one of the first and most prominent social anthropologists to discuss cognition within the context of cultural settings presenting a firm argument against the functionalist psychology that many educationalists refer to implicitly. For Lave, learning is a process ungone by an actor within a specific context. The skills or knowledge learned in one process are not generalizable nor reliably transferred to other areas of human action. Her primary focus was on mathematics in context and mathematics education.

The broader implications reached by Lave and others who specialize in Situated learning are that beyond the argument that certain knowledge is necessary to be a member of society (a Durkheimian argument), knowledge learned in the context of a school is not reliably transferable to other contexts of practice.

Economic

Beyond the explicitly political implications, economic implications of democratic education converge with the emerging consensus on 21st century business and management priorities including increased collaboration, decentralized organization, and radical creativity.

Schools should be democratic, not education

Sudbury schools contend that values, social justice and democracy included, must be learned through experience as Aristotle said: "For the things we have to learn before we can do them, we learn by doing them." They adduce that for this purpose schools must be institutions in which all persons possess, at the point of entry and from the moment they enter, all the individual rights adults have in the country and, encourage ethical behavior and personal responsibility. In order to achieve these goals schools must allow students the three great freedoms—freedom of choice, freedom of action and freedom to bear the results of action—that constitute personal responsibility.

www.numerons.in

Humanistic education

Humanistic education is an alternative approach to education based on the work of humanistic psychologists, most notably Abraham Maslow, who developed a famous hierarchy of needs, Carl Rogers, previous president of the American Psychology Association and Rudolf Steiner, the founder of Waldorf education. In humanistic education, the whole person, not just the intellect, is engaged in the growth and development that are the signs of real learning. The emotions, the social being, the mind, and the skills needed for a career direction are all focuses of humanistic education. "Much of a humanist teacher's effort would be put into developing a child's self-esteem. It would be important for children to feel good about themselves (high self-esteem), and to feel that they can set and achieve appropriate goals (high self-efficacy)."

www.numerons.in

Principles of Humanistic Education

Choice or Control

The humanistic approach focuses a great deal on student choice and control over the course of their education. Students are encouraged to make choices that range from day-to-day activities to periodically setting future life goals. This allows for students to focus on a specific subject of interest for any amount of time they choose, within reason. Humanistic teachers believe it is important for students to be motivated and engaged in the material they are learning, and this happens when the topic is something the students need and want to know.

www.numerons.in

Felt Concern

Humanistic education tends to focus on the felt concerns and interests of the students intertwining with the intellect. It is believed that the overall mood and feeling of the students can either hinder or foster the process of learning.

The Whole Person

Humanistic educators believe that both feelings and knowledge are important to the learning process. Unlike traditional educators, humanistic teachers do not separate the cognitive and affective domains. This aspect also relates to the curriculum in the sense that lessons and activities provided focus on various aspects of the student and not just rote memorization through note taking and lecturing.

Self Evaluation

www.numerons.in

Humanistic educators believe that grades are irrelevant and that only self-evaluation is meaningful. Grading encourages students to work for a grade and not for intrinsic satisfaction. Humanistic educators disagree with routine testing because they teach

students rote memorization as opposed to meaningful learning. They also believe testing doesn't provide sufficient educational feedback to the teacher.

Teacher as a Facilitator

"The tutor or lecturer tends to be more supportive than critical, more understanding than judgmental, more genuine than playing a role." Their job is to foster a engaging environment for the students and ask inquiry based questions that promote meaningful learning.

www.numerons.in

Environment

The environment in a school which focuses their practice on humanistic education tends to have a very different setting than a traditional school. It consist of both indoor and outdoor environments with a majority of time being spent outdoors. The indoor setting may contain a few tables and chairs, bean bags for quiet reading and relaxation, book shelf's, hide-aways, kitchens, lots of color and art posted on the walls. The outdoor environment is very engaging for students. You might find tree houses, outdoor kitchens, sand boxes, play sets, natural materials, sporting activities etc. The wide range of activities are offered for students allowing for free choices of interest.

Liberal education

www.numerons.in

Liberal education is education based on the medieval concept of the liberal arts or, more commonly now, the liberalism of the Age of Enlightenment. It has been described as "a philosophy of education that empowers individuals with broad knowledge and transferable skills, and a stronger sense of values, ethics, and civic engagement ... characterized by challenging encounters with important issues, and more a way of studying than a specific course or field of study" by the Association of American Colleges and Universities. Usually global and pluralistic in scope, it can include a general education curriculum which provides broad exposure to multiple disciplines and learning strategies in addition to in-depth study in at least one academic area.

Liberal education was advocated in the 19th century by thinkers such as John Henry Newman and F.D. Maurice. Sir Wilfred Griffin Eady defined Liberal Education as being education for its own sake and personal enrichment, with the teaching of values.

The decline of liberal education is often attributed to mobilization during the Second World War. The premium and emphasis placed upon mathematics, science, and technical training caused the loss of its prominent position in higher education studies. However, it became central to much undergraduate education in the United States in the mid-20th century, being conspicuous in the movement for 'general education'.

www.numerons.in

In the early years of the 21st century, many universities and liberal arts colleges reviewed their curricula to include a liberal education, or to promote broader undergraduate education infused with its spirit.

Definition

The American Association for the Advancement of Science describes a liberal education in this way: "Ideally, a liberal education produces persons who are open-minded and free from provincialism, dogma, preconception, and ideology; conscious of their opinions and judgments; reflective of their actions; and aware of their place in the social and natural worlds." Liberally educated people are skeptical of their own traditions; they are trained to think for themselves rather than defer to authority.

It also cultivates "active citizenship" through off-campus community service, internships, research, and study abroad. Some faculty see this movement towards "civic engagement" as more pedagogically powerful than traditional classroom teaching, but opponents argue that the education occurring within an academic institution must be purely intellectual and scholarly.

A liberal education combines an education in the classics, English literature, the humanities, and moral virtues. The term liberal education in the modern sense should not be confused with liberal arts education; the latter refers to certain subjects of study, while the former is a way of learning itself and may be pursued through any subject. Indeed, a liberal arts education does not necessarily include a liberal education, and a liberal arts program may even be as specialized as a vocational program.

History

Definitions of a liberal education may be broad, generalized, and sometimes even contradictory. "It is at once the most enduring and changeable of academic traditions." Axelrod, Anisef, and Lin suggest that conceptions of liberal education are rooted in the teaching methods of Ancient Greece, a slave-owning community divided between slaves and freemen. The freemen, mostly concerned about their rights and obligations as citizens, received a non-specialized, non-vocational, liberal arts education that produced well-rounded citizens aware of their place in society. At the same time, Socrates emphasized the importance of individualism, impressing upon his students the duty of man to form his own opinions through reason rather than indoctrination. Athenian education also provided a balance between developing the mind and the body. Another possibility is that liberal education dates back to the Zhou Dynasty, where the teachings of Confucianism focused on propriety, morality, and social order. Hoerner also suggests that Jesus was a liberal educator, as "he was talking of a free man capable of thinking for himself and of being a responsible citizen," but liberal education is still commonly traced back to the Greeks.

The early notions of liberal education found in Greece and Rome came under attack, when a Christian movement began to focus exclusively on all things spiritual, and banned exercise and anything else that had to do with the body or nature. While liberal education was

www.numerons.in

stifled during the Middle Ages, it was fully restored in free cities that rose to power in the eleventh and twelfth centuries. The thirteenth and fourteenth centuries saw a revolt against the spirit, and educators instead focused on the human. This humanist approach favored reason and nature; it was the teacher's job to discover and develop each student's individual talents. In designing the curriculum, the humanists attacked theology and dialectic, especially Aristotelianism.

Study of the classics and humanities slowly returned also in the fourteenth century, which led to increased study of both Greek and Latin. In the fifteenth and sixteenth centuries, liberal education focused mostly on the classics. Commoners, however, were not too keen on studying the classics, so they instead took up vernacular languages and literature, and also the sciences. Until at least the twentieth century, both humanist and classicist influences remained in the liberal education, and proponents of a progressive education also embraced the humanist philosophy. Study of the classics continued in the form of the Great Books program.

www.numerons.in

Relationship with professional education

Liberal education and professional education have often been seen as divergent. German universities moved towards more professional teaching in the nineteenth century, and unlike American students, who still pursued a liberal education, students elsewhere started to take professional courses in the first or second year of study. In the early twentieth century, American liberal arts colleges still required students to pursue a common curriculum, whereas public universities allowed a student to move on to more pragmatic courses after having taken general education courses for the first two years of study. As an emphasis on specialized knowledge grew in the middle of the century, colleges began to adjust the proportion of required general education courses to those required for a particular major.

www.numerons.in

As University of Chicago professor Martha Nussbaum points out, standardized testing has placed more emphasis on honing technical knowledge, and its quantitative, multiple-choice nature prompts rote learning in the classroom. At the same time, humanistic concepts such as imagination and critical thinking, which cannot be tested by such methods, are disappearing from college curricula.

Thirty percent of college graduates in the United States are likely to eventually work in jobs that do not exist yet. Proponents of a liberal education therefore argue that a postsecondary education must prepare students for an increasingly complex labor market. Rather than provide narrowly designed technical courses, a liberal education would foster critical thinking and analytical skills that allow the student to adapt to a rapidly changing workforce. The movement towards career-oriented courses within a liberal education has begun at places like Dartmouth College, where a journalism course combines lessons on writing style with reading and analyzing historical journalism. An American survey of CEOs published in 1997 revealed that employers were more focused on the long-term outcomes of education, such as adaptability, than college students and their parents, who were more concerned with the short-term outcomes of getting a job.

www.numerons.in

Provision

As of 2009, only eight percent of colleges provide a liberal education to four percent of students in the United States. Liberal education revived three times in the United States during periods of industrialization and shifts of social preoccupations—before World War I, after World War II, and in the late 1970s—perhaps as a reaction against overspecialization in undergraduate curricula.

www.numerons.in

Chinese universities began to implement liberal curricula between the 1920s and 1940s, but shifted to specialized education upon the establishment of the People's Republic of China in 1949. Higher education reform in the 1990s returned to liberal education. In 2000 Peking University started to offer a liberal education curriculum to its undergraduate students, followed by other institutions throughout the country.

Sudbury school

A Sudbury school is a school that practices a form of democratic education in which students individually decide what to do with their time, and learn as a by-product of ordinary experience rather than adopting a descriptive educational syllabus or standardized instruction by classes following a prescriptive curriculum. Students have complete responsibility for their own education and the school is run by direct democracy in which students and staff are equals.

www.numerons.in

The name 'Sudbury' refers to Sudbury Valley School, founded in 1968 in Framingham, Massachusetts, the first school of this type. There are now more than 30 Sudbury-type schools around the world. These schools are not formally associated in any way, but are a loosely connected network that are mutually supportive of each other, operating as independent entities. See Sudbury Valley School Educational Philosophy.

The model differs in some ways from other types of democratic schools and anarchistic free schools, but there are many similarities:

- De-emphasis of classes: There is no curriculum or set of required courses. Instead learner interest guides things, with students studying what they want to study. There are generally no classrooms, just rooms where people choose to congregate.
- Age mixing: students are not separated into age-groups of any kind and are allowed to mix freely, interacting with those younger and older than themselves; free age-mixing is emphasized as a powerful tool for learning and development in all ages.
- Autonomous democracy: parents have limited involvement or no involvement in the school administration; Sudbury schools are run by a democratic school meeting where the students and staff participate exclusively and equally. Such meetings are also the sole authority on hiring and firing of staff, unlike most other schools.

www.numerons.in

Sudbury schools are based on the belief that no kind of curriculum is necessary to prepare a young person for adult life. Instead, these schools emphasize learning as a natural by-product of all human activity.

School democracy

All aspects of governing a Sudbury School are determined by the weekly School Meeting, modeled after the traditional New England town meeting. School Meeting passes, amends and repeals school rules, manages the school's budget, and decides on hiring and firing of staff. Each individual present — whether student or staff — has exactly one vote, and most decisions are made by simple majority, with the vote of a child counting as much as an adult.

School rules are normally compiled in a law book, updated repeatedly over time, which forms the school's code of law. Usually, there is a set procedure to handle complaints, and most of the schools follow guidelines that respect the idea of due process of law. There are usually rules requiring an investigation, a hearing, a trial, a sentence, and allowing for an appeal, generally following the philosophy that students face the consequences of their own behavior.

Learning

Sudbury schools are based on the belief that no kind of curriculum is necessary to prepare a young person for adult life. Instead, these schools place emphasis on learning as a natural by-product of all human activity. Learning is self-initiated and self-motivated. They rely on the free exchange of ideas and free conversation and interplay between people, to provide sufficient exposure to any area that may prove relevant and interesting to the individual. Students of all ages mix together; older students learn from younger students as well as vice versa. Students of different ages often mentor each other in social skills. The pervasiveness of play has led to a recurring observation by first-time visitors to a Sudbury school that the students appear to be in perpetual "recess".

Implicitly and explicitly, students are given responsibility for their own education, meaning the only person designing what a student will learn is the student him- or herself or by the way of apprenticeship. As such, Sudbury schools do not compare or rank students — the system has no tests, evaluations, or transcripts.

Positive behavior support

Positive behavior support strives to use a system to understand what maintains an individual's challenging behavior. Students' inappropriate behaviors are difficult to change because they are functional; they serve a purpose for the child. These behaviors are supported by reinforcement in the environment. Functional assessment clearly describes a behavior, identifies the contexts (events, times, and situation) that predict when behavior will and will not occur, and identifies consequences that maintain the behavior. It also

www.numerons.in

summarizes and creates a hypothesis about the behavior, and directly observes the behavior and takes data to get a baseline. The positive behavior support process involves goal identification, information gathering, hypothesis development, support plan design, implementation and monitoring.

The criteria for treatment methods that work include: feasibility, desirability, and effectiveness. Treatment strategies are needed that teachers and parents are able and willing to use and that have an impact on the child's ability to participate in community and school activities. Positive behavior support has increasingly been recognized as a strategy that meets these criteria. By changing stimulus and reinforcement in the environment and teaching the child in their deficit skill set areas the student's behavior changes in ways that allow him/her to be included in the general education setting. The three areas of deficit skills identified in the article were communication skills, social skills, and self-management skills. Re-directive therapy as positive behavior support is especially effective in the parent–child relationship. Where other treatment plans have failed re-directive therapy allows for a positive interaction between parents and children. Positive behavior support is successful in the school setting because it is primarily a teaching method (Swartz, 1999).

www.numerons.in

PBS in schools

Schools are required to conduct functional behavioral assessment (FBA) and use positive behavior support with students who are identified as disabled and are at risk for expulsion, alternative school placement, or more than 10 days of suspension. Even though FBA is required under limited circumstances it is good professional practice to use a problem-solving approach to managing problem behaviors in the school setting (Crone & Horner 2003).

www.numerons.in

The use of Positive Behavior Intervention Supports (PBIS) in schools is widespread (Sugai & Horner, 2002). The program offers a primary, secondary, and tertiary level of intervention. A basic tenet of the PBIS approach includes identifying students in one of three categories based on risk for behavior problems. Once identified, students receive services in one of three categories: primary, secondary, or tertiary. To help practitioners with differences in interventions used at each of the levels the professional literature refers to a three-tiered (levels) model (Stewart, Martella, Marchand-Martella, & Benner, 2005; Sugai, Sprague, Horner & Walker, 2000; Tobin & Sugai, 2005; Walker et al., 1996). Interventions are specifically developed for each of these levels with the goal of reducing the risk for academic or social failure. These interventions may be behavioral and or academic interventions incorporating scientifically proven forms of instruction such as direct instruction. The interventions become more focused and complex as one examines the strategies used at each level.

www.numerons.in

Primary prevention strategies focus on interventions used on a school-wide basis for all students (Sugai & Horner, 2002). This level of prevention is considered "primary" because all students are exposed in the same way, and at the same level, to the intervention. The primary prevention level is the largest by number. Approximately 80–85% of students who are not at risk for behavior problems respond in a positive manner to this prevention level.

Primary prevention strategies include, but are not limited to, using effective teaching practices and curricula, explicitly teaching behavior that is acceptable within the school environment, focusing on ecological arrangement and systems within the school, consistent use of precorrection procedures, using active supervision of common areas, and creating reinforcement systems that are used on a school-wide basis (Lewis, Sugai, & Colvin, 1998; Martella & Nelson, 2003; Nelson, Crabtree, Marchand-Martella & Martella, 1998; Nelson, Martella, & Marchand-Martella, 2002).

www.numerons.in

Secondary prevention strategies involve students (i.e., 10–15% of the school population) who do not respond to the primary prevention strategies and are at risk for academic failure or behavior problems but are not in need of individual support (Nelson, et al., 2002). Interventions at the secondary level often are delivered in small groups to maximize time and effort and should be developed with the unique needs of the students within the group. Examples of these interventions include social support such as social skills training (e.g., explicit instruction in skill-deficit areas, friendship clubs, check in/check out, role playing) or academic support (i.e., use of scientifically-validated intervention programs and tutoring). Additionally, secondary programs could include behavioral support approaches (e.g., simple Functional Behavioral Assessments [FBA], precorrection, self-management training). Even with the heightened support within secondary level interventions, some students (1–7%) will need the additional assistance at the tertiary level (Walker et al., 1996).

Tertiary prevention programs focus on students who display persistent patterns of disciplinary problems (Nelson, Benner, Reid, Epstein, & Currin, 2002).

www.numerons.in

Tertiary-level programs are also called intensive or individualized interventions and are the most comprehensive and complex. The interventions within this level are strength-based in that the complexity and intensity of the intervention plans directly reflect the complexity and intensity of the behaviors. Students within the tertiary level continue involvement in primary and secondary intervention programs and receive additional support as well. These supports could include use of full FBA, de-escalation training for the student, heightened use of natural supports (e.g., family members, friends of the student), and development of a Behavior Intervention Plan (BIP).

Although comprehensive services are important for all students, a critical aspect of the three-tiered model is the identification of students at one of the three levels. One method of identifying students in need of interventions is to analyze office disciplinary referrals (ODR) taken at the school (Irvin et al., 2006). ODRs may be a means of both identifying students' risk level for antisocial behavior and school failure (Walker et al., 1996). Researchers have advocated analyzing this naturally occurring data source as a relatively cheap, effective, and ongoing measurement device for PBS programs (Irvin et al., 2006; Putnam, Luiselli, Handler, & Jefferson, 2003; Sprague et al., 2001; Sugai et al., 2000; Tidwell, Flannery, & Lewis-Palmer, 2003; Walker, Cheney, Stage, & Blum, 2005).

www.numerons.in

ODRs have also been shown to be effective in determining where students fall within a three-leveled model (Sugai et al., 2000), developing professional development as well as

helping coordinate school efforts with other community agencies (Tobin & Sugai, 1997; Tobin, Sugai, & Colvin, 2000), predicting school failure in older grades as well as delinquency (Sprague et al., 2001), indicating types of behavior resulting in referrals (Putnam et al., 2003), and determination of the effectiveness of precorrection techniques (Oswald, Safran, & Johanson, 2005). Analyzing discipline referral data can also help school personnel identify where to improve ecological arrangements within a school and to recognize how to increase active supervision in common areas (Nelson, Martella, & Galand, 1998; Nelson et al., 2002).

www.numerons.in

Functional behavioral assessment

Functional behavior assessment (FBA) emerged from applied behavior analysis. It is the first step in individual and cornerstone of a Positive Behavior Support plan. The assessment seeks to describe the behavior and environmental factors and setting events that predict the behavior in order to guide the development of effective support plans. Assessment lays the foundation of PBS. The assessment includes:

- a description of the problem behavior and its general setting of occurrence
- identification of events, times and situations that predict problem behavior
- identification of consequences that maintain behavior
- identification of the motivating function of behavior
- collection of direct observational data
- identification of alternative behavior that could replace the child's problem behavior (i.e., what the normal child does). Often this is measured through direct observation or standardized behavioral assessment instruments.

www.numerons.in

In some cases, the problem behavior identified in the functional behavior assessment is further analyzed by conducting a behavior chain analysis—in which the sequences of behavior that build up to the problem behavior become the focus.

The results of the assessment help in developing the individualized behavior support plan. This outlines procedures for teaching alternatives to the behavior problems, and redesign of the environment to make the problem behavior irrelevant, inefficient, and ineffective.

Another avenue of functional behavior assessment is growing in popularity—it is called behavior chain analysis. In behavior chain analysis, one looks at the progressive changes of behavior as they lead to problem behavior and then attempts to disrupt this sequence. Where as FBA is concerned mostly with setting-antecedent-behavior-consequence relations, the behavior chain analysis looks at the progression of behavior, such as first the child may fidget, then he might begin to tease others, then he might start to throw things, and then finally hit another student.

www.numerons.in

Behavioral strategies available

There are many different behavioral strategies that PBS can use to encourage individuals to change their behavior. Some of these strategies are delivered through the consultation

process to teachers. The strong part of functional behavior assessment is that it allows interventions to directly address the function (purpose) of a problem behavior. For example, a child who acts out for attention could receive attention for alternative behavior (contingency management) or the teacher could make an effort to increase the amount of attention throughout the day (satiation). Changes in setting events or antecedents are often preferred by PBS because contingency management often takes more effort. Another tactic especially when dealing with disruptive behavior is to use information from a behavior chain analysis to disrupt the behavioral problem early in the sequence to prevent disruption. Some of the most commonly used approaches are:

www.numerons.in

- Modifying the environment, antecedents (such as curriculum) to behavior, or routine
- Providing an alternative to the undesired behavior (not the same as a reward; it should be an alternative that is readily available to the person. The thought behind this is that the person may, over time, learn to more independently seek out appropriate options rather than the undesired behavior(s).)
- Tactical ignoring of the behavior
- Distracting the child
- Positive reinforcement for an appropriate behavior
- Changing expectations and demands placed upon the child
- Teaching the child new skills and behaviors
- Modification techniques such as desensitization and graded extinction
- Changing how people around the child react
- Time-out (child)
- Medication.

www.numerons.in

Behavior management program

The main keys to developing a behavior management program include:

- Identifying the specific behaviors to address
- Establishing the goal for change and the steps required to achieve it
- Procedures for recognizing and monitoring changed behavior
- Choosing the appropriate behavioral strategies that will be most effective.

Through the use of effective behavior management at a school-wide level, PBS programs offer an effective method to reduce school crime and violence. To prevent the most severe forms of problem behvior, normal social behavior in these programs needs to be actively taught.

Consequential management/contingency management

www.numerons.in

Consequential management is a positive response to challenging behavior. It serves to give the person informed choice and an opportunity to learn. Consequences must be clearly related to the challenging behavior. For example, if a glass of water was thrown and the glass smashed, the consequence (restitution) would be for the person to clean up the mess

and replace the glass. These sorts of consequences are consistent with normal social reinforcement contingencies.

Providing choices is very important and staff can set limits by giving alternatives that are related to a behavior they are seeking. It is important that the alternative is stated in a positive way and that words are used which convey that the person has a choice. For example:

www.numerons.in

- Coercive approach – "If you don't cut that out you'll have to leave the room."
- Positive approach – "You can watch TV quietly or leave the room."

Student voice

Student voice describes the distinct perspectives and actions of young people throughout schools focused on education. "Student voice is giving students the ability to influence learning to include policies, programs, contexts and principles."

Definition

Student voice is the individual and collective perspective and actions of young people within the context of learning and education. It is identified in schools as both a metaphorical practice and as a pragmatic concern.

Practice

www.numerons.in

Student voice work is premised on the following convictions:

- Young people have unique perspectives on learning, teaching, and schooling;
- Their insights warrant not only the attention but also the responses of adults; and
- They should be afforded opportunities to actively shape their education.

Several typologies differentiate the practices that identify as student voice. One identifies multiple roles for students throughout the education system, including education planning, research, teaching, evaluating, decision-making and advocacy.

Administrative approaches

The presence and engagement of student voice has been seen as essential to the educational process since at least the time of John Dewey, if not long before. In 1916 Dewey wrote extensively about the necessity of engaging student experience and perspectives in the curriculum of schools, summarizing his support by saying,:

www.numerons.in

The essence of the demand for freedom is the need of conditions which will enable an individual to make his own special contribution to a group interest, and to partake of its

activities in such ways that social guidance shall be a matter of his own mental attitude, and not a mere authoritative dictation of his acts.

Today student voice is seeing a resurgence of importance as a growing body of literature increasingly identifies student voice as necessary throughout the educational process. Areas where advocates encourage actively acknowledging student voice include curriculum design and instructional methods, Educational leadership and general school reform activities, including research and evaluation.

www.numerons.in

Curricular approaches

Specific types of activities that can specifically engage student voice include teaching, education decision-making, school planning, participatory action research, learning and teaching evaluations, educational advocacy, and student advisories for principals and superintendents.

Service learning

Engaging student voice is a primary objective of service learning, which commonly seeks to entwine classroom learning objectives with community service opportunities. Student voice is also present in student government programs, experiential education activities, and other forms of student-centered learning.

Student as education decision-makers

www.numerons.in

Engaging students as educational decision-makers is the practice of actively teaching young people responsibility for their education by systematically engaging them in making choices about learning, schooling, and the education system in areas ranging from what affects them personally to what affects an entire student body to what affects the entire school system.

Choosing curricula, calendar year planning, school building design, teacher hiring, and many more issues are often seen as the duties of a school principal or teachers. Today those roles are increasingly seen as avenues for student voice. Students are joining boards of education at all levels, including local, district, and state boards. Some education agencies engage students as staff in programs where they make decisions about grant making, school assessment, and other areas. Students are also participate in decision-making by establishing and enforcing codes of conduct and in personal education decision-making, such as choosing classes and deciding whether to attend school.

Worldwide examples

www.numerons.in

Education reform has long been the domain of parents, teachers, school administrators and politicians. In some nations, however, there is a trend beginning to encompass a much larger element of student participation in scholastic affairs.

Australia

The Connect journal, published in Melbourne, features dozens of examples of student voice throughout education in its bi-monthly publication.

The Victorian Student Representative Council is the umbrella or peak body of Student Councils in Victoria, Australia. It is supported with funding from the Victorian Department of Education and Early Childhood Development (DEECD) and auspiced by the Youth Affairs Council of Victoria (YACVic). The VicSRC is an organisation run by secondary school students, elected by their peers.

www.numerons.in

Canada

Including student voice on district school boards was mandated by the Ontario Education Act in 1998. Students in each one of the 72 provincial school boards are represented by a 'pupil representative', commonly called "Student Trustee". They are meant to represent the needs and concerns of students in discussions with the school board administration and the province. The Ontario Student Trustees' Association, OSTA-AECO, has become Ontario's chief student stakeholder, providing professional development to its members and advocates for students' educational interests. The Society for Democratic Education is an organization in Toronto that includes many aspects of heightened student inclusion in education reform policy. The Society for Democratic Education was founded in early 2005 by Bianca Wylie. It has published several essays and position papers that discuss the importance of wide-scale education reform, especially in how it applies to secondary level education and civic education.

www.numerons.in

Another Canadian organization of note is Learning for a Cause founded in 2004 by educator and poet Michael Ernest Sweet Learning for a Cause which promotes student voices for social change through creative writing and publishing opportunities for Canadian students.

Provincial governments and Ministries of Education across Canada are also getting on board with student engagement and student voice. Alberta Education launched Speak Out - the Alberta Student Engagement Initiative in November 2008 and thousands of students have been sharing their ideas on how to improve how education looks and feels for them.

Ontario's SpeakUp initiative seeks students ideas on what strengthens their engagement in their learning. Over 2900 SpeakUp projects led by students have received grants. The 9 Student Voice indicators are the outcome of regional student forums held across the province. The members of the Minister's First Student Advisory Council met in May and August 2009 and have made four key recommendations. The members of the Second Minister's Student Advisory Council have been selected, and have already met in May 2010, and are to meet again in August. More information is available at SpeakUp.

www.numerons.in

The Calgary Board of Education, in 2010, launched the Chief Superintendent's Student Advisory Council - a group of high school students with student representation from each of the Calgary Board of Education's high school programs. They meet regularly with the

Calgary Board of Education's Chief Superintendent, Naomi Johnson, to discuss issues in the system and propose solutions.

Chile

A powerful example of student voice in school improvement comes from the 2006 student protests in Chile. Throughout the spring of that year, public high school students from across the country began a series of protests, school takeovers, and negotiations designed to bolster support for public education improvement. After seeing the massive effect of the students, government officials met their demands and are working to support ongoing reforms as necessitated by students.

United Kingdom

The English Secondary Student's Association is the representative body for secondary students in England. It aims to support students in expressing their views about education by providing workshops and a network of support with other secondary school students. The National College for School Leadership provides career-long learning and development opportunities, professional and practical support for England's existing and aspiring school leaders. Their goal is to ensure that school leaders have the skills, recognition, capacity and ambition to transform the school education system into the best in the world. The Phoenix Education Trust is the organisation that helped to found ESSA and currently provides the students with administrative support. It aims to explore and support education in which children are trusted and respected and their participation in decision-making is encouraged. involver support schools to develop sustainable structures for effective student voice, school councils and participation, and work with teachers and pupils in primary, secondary and special schools. involver provides training, resources, ongoing support and access to a large UK network of schools. The Organizing Bureau of European School Students Unions is the umbrella organisation for secondary school student organisations in European. Some state schools are also pushing student Voice internally and independently across the UK. Schools like Quintin Kynaston School are now recognised for having one of the largest and most active Student Voice 'faculties' in the country.

Ireland

In Ireland, the Irish Second-Level Students' Union (ISSU) is the national umbrella body for second-level school Student Councils.

United States

SoundOut is the only nonprofit education program in the US solely focused on engaging student voice throughout education. SoundOut works with students, educators, administrators, policy-makers, and academics to raise the profile, substance, and effect of student voice in K-12 settings across the country. The National Youth Rights Association advocates for increased recognition for student rights in schools, including the right to privacy, student access to records, and student representation throughout the education

www.numerons.in

system. What Kids Can Do shares stories of student voice throughout the educational process, both within the school system and throughout the community. Their highlights emphasize exceptional learning, belonging, and engagement of students in a variety of capacities for a variety of purposes, the greatest of which is in order to promote student voice. WKCD has authored several books about student voice, primarily written by Kathleen Cushman working with high school students, including Fires in the Bathroom: Advice from high schools students for teachers and Sent to the Principal's Office. Education|Evolving integrates student voices with current major topics in education policy and maintains an online clearinghouse of student voices on education policy. Their website also has students describing the learning experiences on video. The High School Survey of Student Engagement works with high schools across the country to capture students' beliefs and experiences, and strengthen student engagement in schools.

www.numerons.in

Outcomes

Student voice is increasingly identified as a pillar of successful school reform, as educational researchers, academic institutions, and educational support organizations around the world increasingly advocate for the inclusion of students in the reform process after identifying student voice as a vital element of student engagement.

Criticism

Critical educators including bell hooks, Paulo Freire, and Henry Giroux have voiced concern with the singular notion of a student voice. Another expert has written about this over-simplification, saying that:

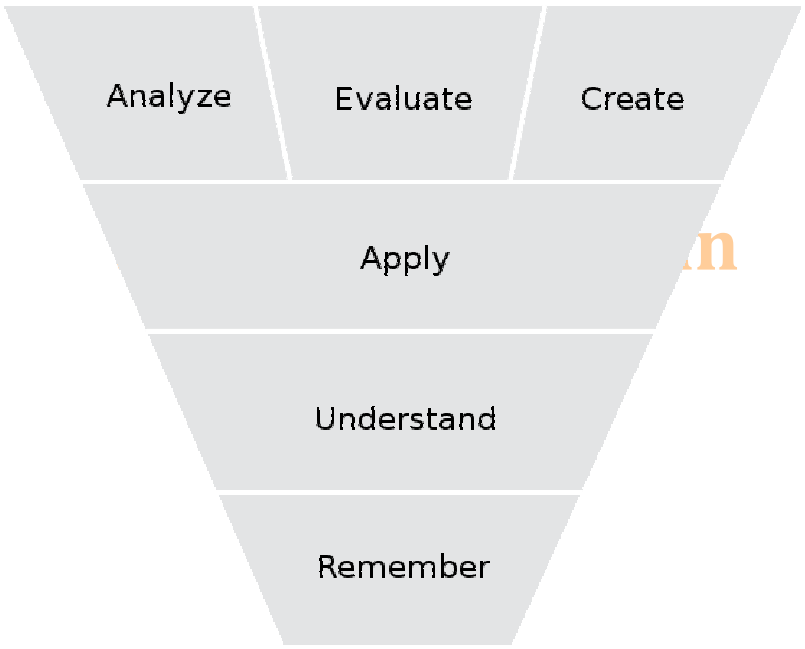
www.numerons.in

> It is not enough to simply listen to student voice. Educators have an ethical imperative to do something with students, and that is why meaningful student involvement is vital to school improvement.

Higher-order thinking

Higher-order thinking is a concept of Education reform based on learning taxonomies such as Bloom's Taxonomy. The idea is that some types of learning require more cognitive processing than others, but also have more generalized benefits. In Bloom's taxonomy, for example, skills involving analysis, evaluation and synthesis (creation of new knowledge) are thought to be of a higher order, requiring different learning and teaching methods, than the learning of facts and concepts. Higher order thinking involves the learning of complex judgmental skills such as critical thinking and problem solving. Higher order thinking is more difficult to learn or teach but also more valuable because such skills are more likely to be usable in novel situations (i.e., situations other than those in which the skill was learned).

www.numerons.in



Categories in the cognitive domain of Bloom's Taxonomy (Anderson & Krathwohl, 2001)

Standards based testing

www.numerons.in

Standards based tests rely on HOTS for many test items released by U.S. states such as Washington. For example, one fourth grade WASL problem published in 1997 asked how to measure the height of a flagpole given a sun, shadows, a ruler and a fire hydrant. A standard solution for this problem uses similar triangles, a skill not remembered by most adults, and which does not appear on state mathematics standards until the 10th grade. However, the solution published in the Seattle Post Intelligencer does not even use this method.

Mathematics

Similarly, textbooks such as Dale Seymour's Investigations omit many standard arithmetic methods, instead relying on students to construct their own ways to compute averages, and perform multiplication and division. Teachers are directed to discourage students who may have been taught how to regroup or take a sum and divide by the number of items to compute an average.

www.numerons.in

Time-out (parenting)

A time-out involves temporarily separating a child from an environment where inappropriate behavior has occurred, and is intended to give an over-excited child time to calm down. It is an educational and parenting technique recommended by some pediatricians and developmental psychologists as an effective form of child discipline. It involves temporarily removing a child from an environment where inappropriate behavior has occurred, thereby discouraging such behavior. Often a corner (hence the common term corner time) or a similar space where the child is to stand or sit during time-outs is designated.

www.numerons.in

Timeouts are often known as the naughty chair or naughty step, a term popularized by Jo Frost of Supernanny.

History

The concept of time-out was invented, named, and used by Arthur Staats in his extended work with his daughter (and later son), and was part of a long-term program of behavioral analysis beginning in 1958 that treated various aspects of child development. He introduced various elements that later composed foundations for applied behavior analysis and behavior therapy (the token reward system was another invention). Montrose Wolf, a graduate student assistant of Staats on several studies dealing with reading learning in preschoolers (see, for example, Staats, A.W.; Staats, C.K.; Schultz, R.E.; Wolf, M.M. "The conditioning of textual responses using 'extrinsic' reinforcers."), used that background when he went to the University of Washington where he began his creative program of research. Wolf first used Staats' time-out procedure in a 1964 published study dealing with the behavioral treatment of a child.

www.numerons.in

Staats used the term in his 1968 book, Learning, Language and Cognition. Staats described the discipline of his 2-year old daughter in 1962: "I would put her in her crib and indicate that she had to stay there until she stopped crying. If we were in a public place [where her behavior was inappropriate], I would pick her up and go outside [until she indicated she would stop the offending behavior]." In brief, he "intended time-out to constitute a very mild punishment, the removal from a more reinforcing situation." This has the effect of weakening the offending behavior so that it occurs less frequently, quickly disappearing unless the behavior has been well learned.

Application

Time-outs are recommended for toddlers and younger children. The purpose is to isolate or separate the child for a short period of time in order to allow the child to calm down, as well as to discourage inappropriate behavior.

www.numerons.in

Time-outs may be on a chair, step, corner or any other location where there are no distractions. The child should be old enough to sit still and is required to remain there for a

fixed period as a punishment and to allow them time to reflect on their actions and consequences of it. The procedure has been recommended as a time for parents to separate feelings of anger toward the child for their misbehavior, replacing yelling with a calmer and more predictable approach.

To be most effective, parents should evaluate each situation to determine what may be causing the misbehavior, such as a toy, frustration, hunger or lack of sleep. Parents should also explain why the child was put there, in order to make it an opportunity for learning, and how long he must stay there.

www.numerons.in

In some views, the only requirement for release is for the child to be sitting quietly, while others advocate a set period of time. When the child has calmed down, they may then express their needs in a more polite manner or return to their activity. Jo Frost recommends one minute per year of age.

Effectivenes

While some proponents of time-outs insist on silence and stillness from the child during the time-out, it is easier to use a "release-contingency," such that the requirement is only that the child is sitting quietly at the end of the time-out period. Those who use time-out for children to get anger and frustration "out of their system" or for children to think about their behavior, are using time-out in a way that is different than those basing it on operant behavioral principles (that time-out/away from reinforcement may reduce recurrences of the unwanted target behavior).

www.numerons.in

Some of those in favor of spanking have argued that time-outs are ineffective and argue that it should be seen as a complement rather than as an alternative to spanking; a spanking may be preceded and/or followed by a time-out 'to think about what you did'; some individual order time-out to be spent divested as during spanking, even exposing the reddened bare bottom afterwards, with the hope of making the punishment more humiliating.

Spanking sometimes is used as a penalty if the child refuses to serve the time-out. However, spanking is illegal in several countries, and other back-up penalties could be used, such as privilege withdrawal substantial enough to encourage serving time-outs instead.

Child discipline

Child discipline is the set of rules, rewards and punishments administered to teach self control, increase desirable behaviors and decrease undesirable behaviors in children. In its most general sense, discipline refers to systematic instruction given to a disciple. To discipline thus means to instruct a person to follow a particular code of conduct. While the purpose of child discipline is to develop and entrench desirable social habits in children, the ultimate goal is to foster sound judgement and morals so the child develops and maintains self discipline throughout the rest of his/her life.

www.numerons.in

Child discipline is a topic that draws from a wide range of interested fields, such as parents, the professional practice of behavior analysis, developmental psychology, social work, and various religious perspectives. Because the values, beliefs, education, customs and cultures of people vary so widely, along with the age and temperament of the child, methods of child discipline vary widely.

In western society, there has been debate in recent years over the use of corporal punishment for children in general, and increased attention has been given to the concept of "positive parenting" where good behaviour is encouraged and rewarded.

www.numerons.in

Historical perspectives

Historical research suggests that there has always a been a great deal of individual variation in methods of discipline and thus no century was notably cruel or kind.

Biblical views

The Book of Proverbs from the Bible mention the importance of disciplining children, as opposed to leaving them neglected or unruly, in several verses. Interpretation of these verses varies, as do many passages from the Bible, from literal to metaphorical. The most often paraphrased is from Proverbs 13:24 "He that spareth his rod hateth his son: but he that loveth him chasteneth him betimes." Other passages that mention the 'rod' are Proverbs 23:14, "Thou shalt beat him with the rod, and shalt deliver his soul from hell," and Proverbs 29:15, "The rod and reproof give wisdom: but a child left to himself bringeth his mother to shame."

www.numerons.in

Although the Bible's lessons have been paraphrased for hundreds of years, the modern phrase, "Spare the rod and spoil the child," was coined by Samuel Butler, in Hudibras, a mock heroic narrative poem, published in 1663.

Medieval views

The primary guidelines followed by medieval parents in training their children were from the Bible. Scolding was considered ineffectual, and cursing a child was a terrible thing. In general, the use of corporal punishment was as a disciplinary action taken to shape behavior, not a pervasive dispensing of beatings for no reason. Corporal punishment was undoubtedly the norm. The medieval world was a dangerous place, and it could take harsh measures to prepare a child to live in it. Pain was the medieval way of illustrating that actions had consequences.

www.numerons.in

Influence of John Locke

In his 1690 Essay Concerning Human Understanding English physician and philosopher John Locke argued that the child resembled a blank tablet (tabula rasa) at birth, and was not inherently full of sin. In his 1693 Some Thoughts Concerning Education he suggested

that the task of the parent was to build in the child the strong body and habits of mind that would allow the capacity of reason to develop, and that parents could reward good behavior with their esteem and punish bad behavior with disgrace – the withdrawal of parental approval and affection - as opposed to beatings.

The twentieth century

In the early twentieth century, child-rearing experts abandoned a romantic view of childhood and advocated formation of proper habits to discipline children. A 1914 U.S. Children's Bureau pamphlet, Infant Care, urged a strict schedule and admonished parents not to play with their babies. John B. Watson's 1924 Behaviorism argued that parents could train malleable children by rewarding good behavior and punishing bad, and by following precise schedules for food, sleep, and other bodily functions.

www.numerons.in

Although such principles began to be rejected as early as the 1930s, they were firmly renounced in the 1946 best-seller Baby and Child Care, by pediatrician Benjamin Spock, which told parents to trust their own instincts and to view the child as a reasonable, friendly human being. Dr. Spock revised his first edition to urge more parent-centered discipline in 1957, but critics blamed his popular book for its permissive attitude during the youth rebellions of the 1960s and 1970s.

American psychiatrist Rudolf Dreikurs developed a pragmatic method for understanding the purposes of reprehensible behaviour in children and for stimulating cooperative behaviour without punishment or reward. He suggested that human misbehavior is the result of feeling a lack of belonging to one's social group. When this happens the child acts from one of four "mistaken goals": attention, power, revenge or avoidance (inadequacy). His model predicts that children would learn to cooperate reasonably without being penalized or rewarded if they feel that they are valuable contributors.

www.numerons.in

The return of the rod

Following the turbulent and permissive era of the 1960s and early 1970s, American evangelical Christian James Dobson sought the return of a more conservative society and aimed to promote Biblical parenting. In 1977 he published the first of several parenting books, Dare to Discipline, which advocated spanking of children up to age eight and promoted discipline which would allow "the God of our fathers to be introduced to our beloved children."

“In a day of widespread drug usage, immorality, civil disobedience, vandalism, and violence, we must not depend on hope and luck to fashion the critical attitudes we value in our children. That unstructured technique was applied during the childhood of the generation which is now in college, and the outcome has been quite discouraging. Permissiveness has not just been a failure; it's been a disaster!”

www.numerons.in

Dobson's position is controversial. As early as 1985 The New York Times stated that "most child-care experts today disapprove of physical punishment."

As of 2011 there are hundreds of books, websites, and articles giving varying parenting advice and opinions. While opinion-givers may not agree on the best way to rear children or the best methods of discipline, some recommend consistency for effective discipline. Many also discourage spanking and other physical methods of punishment.

Corporal punishment

www.numerons.in

- Legality of corporal punishment in the United States
- Legality of corporal punishment in Europe
  - Corporal punishment prohibited in schools and the home
  - Corporal punishment prohibited in schools only
  - Corporal punishment not prohibited
- Main article: Corporal punishment in the home

In many cultures, parents have historically had the right to spank their children when appropriate. Attitudes and legislation in some countries have changed in recent years, particularly in continental Europe. Domestic corporal punishment has now (2009) been outlawed in 24 countries around the world, most of them in Europe or Latin America, beginning with Sweden in 1979. Thirty years after Sweden's ban, official figures show that just 10 percent of Swedish children are spanked or otherwise struck by their parents today. More than 90 percent of Swedish children were smacked prior to the ban. The Swedish law does not actually lay down any legal punishment for smacking but requires social workers to support families with problems.

www.numerons.in

In North America, Britain and much of the rest of the English-speaking world, corporal punishment remains highly controversial. In the United States, corporal punishment of children by their parents remains lawful in all 50 states.

The effectiveness of corporal punishment is disputed. Those opposed to spanking argue that other methods of child discipline are both more humane and more effective than physical punishment such as spanking. Some studies have suggested that spanking may lead to more misbehaviour in the long run, and some researchers have linked what they describe as "authoritarian" child-rearing practices with children who withdraw, lack spontaneity, and have lesser evidence of conscience.

A 2006 retrospective report study in New Zealand showed that physical punishment of children was quite common in the 1970s and 80s, with 80% of the sample reporting some kind of corporal punishment from parents, at some time during childhood. Among this sample, 29% reported being hit with an empty hand, 45% with an object, and 6% were subjected to serious physical abuse. The study noted that abusive physical punishment tended to be given by fathers and often involved striking the child's head or torso instead of the buttocks or limbs.

www.numerons.in

Stress positions

Stress positions, such as murga punishment in South Asia or forced prolonged kneeling (sometimes on beans or salt to increase discomfort), are used as punishment for children.

Non-physical discipline

Non-physical discipline consists of both punitive and non-punitive methods, but does not include any forms of corporal punishment such as smacking or spanking. There is an active effort on the part of parenting professionals and organizations to shift traditional parental use of corporal punishment to non-physical methods. The regular use of any single form of discipline becomes less effective when used too often, a process psychologists call habituation. Thus, no single method is considered to be for exclusive use.

www.numerons.in

Time-outs

A common method of child discipline is sending the child away from the family or group after misbehavior. Children may be told to stand in the corner ("corner time") or may be sent to their rooms for a period of time.

Heading text

A time-out involves isolating or separating a child for a few minutes, and is intended to give an over-excited child time to calm down.

Time-out, painting by Carl Larsson

www.numerons.in

Alternatively, time-outs have been recommended as a time for parents to separate feelings of anger toward the child for their behavior and to develop a plan for discipline.

Time-outs are also frequently used as a punishment, however, many experts (such as Alfie Kohn) do not advocate this.

Grounding

Grounding is a form of punishment, usually for older children, preteens and teenagers, that restricts their movement outside of the home, such as visiting friends or using the car. Sometimes it is combined with the withdrawal of privileges.

Scolding

Scolding involves reproving or criticizing a child's negative behavior and/or actions. Just as verbal praise may be a powerful reinforcer for most children, verbal scolding may be a sufficient punishment on its own.

www.numerons.in

Non-punitive discipline

While punishments may be of limited value in consistently influencing rule-related behavior, non-punitive discipline techniques have been found to have greater impact on children who have begun to master their native language. Non-punitive discipline (also known as empathic discipline and positive discipline) is an approach to child-rearing that does not use any form of punishment. It is about loving guidance, and requires parents to have a strong relationship with their child so that the child responds to gentle guidance as opposed to threats and punishment. According to Dr. Laura Markham, the most effective discipline strategy is to make sure your child wants to please you.

www.numerons.in

Non-punitive discipline also excludes systems of "manipulative" rewards. Instead, a child's behaviour is shaped by "democratic interaction" and by deepening parent-child communication. The reasoning behind it is that while punitive measures may stop the problem behavior in the short term, by themselves they do not provide a learning opportunity that allows children the autonomy to change their own behaviour. Although limits are set and rules enforced, the methods of discipline involved are based on whether it strengthens or weakens a parent's relationship with the child. Many studies show that punishment makes children feel worse about themselves, undermines the relationship with the child and sets up power struggles, which all contribute to make the children act worse. Punishments such as time-outs may be seen as banishment and humiliation. Consequences as a form of punishment are not recommended, but natural consequences are considered to be possibly worthwhile learning experiences provided there is no risk of lasting harm.

Positive discipline is a general term that refers to both non-violent discipline and non-punitive discipline. Criticizing, discouraging, creating obstacles and barriers, blaming, shaming, using sarcastic or cruel humor, or using physical punishment are some negative disciplinary methods used with young children. Any parent may occasionally do any of these things, but doing them more than once in a while may lead to low self-esteem becoming a permanent part of the child's personality.

www.numerons.in

Authors in this field include Aletha Solter, Alfie Kohn, Pam Leo, Haim Ginott, Thomas Gordon, Lawrence J. Cohen, and John Gottman.

Essential aspects

Positive discipline is just a part of the positive parenting concept and is based on minimizing the child's frustrations and misbehavior rather than giving punishments. The foundation of this style of discipline is encouraging children to feel good about themselves and building the parent's relationship with the child so the child wants to please the parent. To achieve this, children need some time with parents every day that they can enjoy and feel good about. Children recognize a parent's love through the time spent with them. Discipline and teaching work best within such positive relationships. Other important aspects are reasonable and age-appropriate expectations, feeding healthy foods and providing enough rest, giving clear instructions which may need to be repeated, looking for the causes of any misbehavior and making adjustments, and building routines. Children are helped by knowing what is happening in their lives. Having some predictability about their day without necessarily being regimental will help reduce frustration and misbehavior.

www.numerons.in

Methods

Praise and rewards

Praise (encouraging words) and intangible rewards (hugs, time with the child, etc.) is an effective method of encouraging good behavior. Simply giving the child spontaneous expressions of appreciation or acknowledgement when they are not misbehaving will act as a reinforcer for good behaviour.

www.numerons.in

It is very common for children who are otherwise ignored by their parents to turn to misbehaviour as a way of seeking attention. An example is a child screaming for attention. Parents often inadvertently reward the bad behavior by immediately giving them the attention, thereby reinforcing it. On the other hand, parents may wait until the child calms down and speaks politely, then reward the more polite behavior with the attention.

Natural consequences

Natural consequences involve children learning from their own mistakes. For instance, if a child forgets to bring his lunch to school, he will find himself hungry later. A variation on this is offering controlled choices, either of which the parent must be agreeable to. For example, a child may be given a choice to have a nap now and stay up later, or play now and go to bed early.

Reason

www.numerons.in

Children who are punished without further reasoning are more likely to repeat the offense and may simply make more of an effort not to get caught.

Internal discipline and democracy

Sudbury model democratic schools, attended by children ages 4 to 19, claim that popularly-based authority can maintain order more effectively than dictatorial authority for governments and schools alike.

Furthermore they emphasize that much more important than the externals of order is the question of the sources of internal discipline: how does an individual come to develop the inner strength and character that endows his life with order and coherence, an independent person appropriate to a free republic of co-equal citizens, capable of making decisions within a rational, self-consistent framework—a person treating and being treated with respect?

www.numerons.in

They affirm that the hallmark of the independent person is the ability to bear responsibility and since there is no way of teaching or training another person for self-sufficiency, there is no technique for obtaining or transmitting these traits. Hence, the only way a person becomes responsible for himself is for him to be responsible for himself, with no

reservation or qualifications. Thence the need to permit children, at home and school, freedom of choice, freedom of action, and freedom to bear the results of action—the three great freedoms that constitute personal responsibility.

Controversy

Some parents feel that positive parenting and non-punitive discipline is too permissive and will lead to unruly and disrespectful children. They also argue that there is no recourse for parents of misbehaving children to effectively control their misbehavior. Deliberate misbehavior, they say, must be firmly punished to prevent its recurrence.

www.numerons.in

Proponents of non-punitive discipline argue that children who misbehave often do it not out of malice, but out of ignorance, boredom or frustration, and simply need to be taught, listened to, or redirected. They argue that a close and loving relationship is vital and if there is such a relationship, the child will want to please the parent and will better accept rules and listen to reason. They also feel that punishments and smacks weaken the relationship which will lead to more problem behavior.

Blanket training

Blanket training is an approach used to train toddlers and pre-schoolers to attain self-discipline. With consistent training, the child will acquire an ability to play contentedly and quietly by him/herself for an extended period of time.

www.numerons.in

A parent designates a certain amount of time (usually 15-45 minutes, depending on the age of the child) that a child must sit by him/herself on a blanket on the floor. The child is not permitted to leave the parameters of the blanket, and may play quietly with a toy while seated on the blanket. After daily training in this manner, eventually the child will sit and play quietly on the blanket whenever and wherever the child is asked to do so. A blanket is used in this method of training because of its easy portability and accessibility in almost any time or location, such as during meal preparations, meetings, ceremonies, and medical appointments.

Known practitioners of the practice include the Duggars Opponents of blanket training call it emotionally abusive. However, child development experts deem this training a satisfactory method for attaining the necessary life skill of self-control as an adult, if gentle redirection and positive verbal reinforcement is used by the parent. They also highlight the fact that the parent of a blanket-trained child is able to confidently keep their children closeby while engaged in business and maintenance activities rather than rely on extra-familial childcare.

www.numerons.in

School discipline

A Harper's Weekly cover from 1898 shows a caricature of school discipline.

School discipline is the system of rules, punishments and behavioral strategies appropriate to the regulation of children and the maintenance of order in schools. Its aim is to create a safe and conducive learning environment in the classroom.

A disciplined student is in compliance with the school rules and codes of conduct. These rules may, for example, define the expected standards of clothing, timekeeping, social behaviour and work ethic. The term discipline is also applied to the punishment that is the consequence of breaking the rules. The aim of discipline is to set reasonable limits which protect students from harm and teach them what is safe and what is not.

www.numerons.in

Historical attitudes to School Discipline

Corporal punishment

Throughout the history of education the most common means of maintaining discipline in schools was corporal punishment. While a child was in school, a teacher was expected to act as a substitute parent, with many forms of parental discipline or rewards open to them. This often meant that students were commonly chastised with the birch, cane, paddle or strap if they did something wrong.

Corporal punishment in schools has now disappeared from most Western countries, including all European countries. Thirty U.S. states have banned it, the others (mostly in the South) have not. Paddling is still used to a significant (though declining) degree in some public schools in Alabama, Arkansas, Georgia, Louisiana, Mississippi, Oklahoma, Tennessee and Texas. Private schools in these and most other states may also use it, though many choose not to do so.

www.numerons.in

Official corporal punishment, often by caning, remains commonplace in schools in some Asian, African and Caribbean countries.

Most mainstream schools in most other countries retain punishment for misbehaviour, but it usually takes non-corporal forms such as detention and suspension.

Modern methods

School discipline practices are generally informed by theory from psychologists and educators. There are a number of theories to form a comprehensive discipline strategy for an entire school or a particular class.

- Positive Approach is grounded in teachers' respect for students. Instills in students a sense of responsibility by using youth/adult partnerships to develop and share clear rules, provide daily opportunities for success, and administer in-school suspension for noncompliant students. Based on Glasser's Reality Therapy. Research (e.g., Allen) is generally supportive of the PAD program.

www.numerons.in

- Teacher Effectiveness Training differentiates between teacher-owned and student-owned problems, and proposes different strategies for dealing with each. Students are taught problem-solving and negotiation techniques. Researchers (e.g., Emmer and Aussiker) find that teachers like the programme and that their behaviour is influenced by it, but effects on student behaviour are unclear.

- Adlerian approaches is an umbrella term for a variety of methods which emphasize understanding the individual's reasons for maladaptive behavior and helping misbehaving students to alter their behavior, while at the same time finding ways to get their needs met. Named for psychiatrist Alfred Adler. These approaches have shown some positive effects on self-concept, attitudes, and locus of control, but effects on behavior are inconclusive (Emmer and Aussiker). Not only were the statistics on suspensions and vandalism significant, but also the recorded interview of teachers demonstrates the improvement in student attitude and behaviour, school atmosphere, academic performance, and beyond that, personal and professional growth.

- The Student Responsibility Center (SRC) discipline process was evaluated for effectiveness in five participating K-12 public schools. SRC was evaluated in terms of meeting the six systems-thinking criteria, the number of suspensions and/or expulsions, the number of discipline referrals to the SRC classroom, and the perceptions of the learning community concerning the use of this discipline process. Examination of data collected from the one-on-one interviews and school staff questionnaires suggested that the SRC discipline process did result in a decrease in suspensions and expulsions and discipline referrals. In addition, the analysis of data indicated that there were positive Learning Community perceptions concerning the discipline process. The finding are congruent with effective schools research and school sites should continuously assess, intervene, and monitor the discipline process to ensure the Learning Community is consistently following the processes' elements and characteristics to accomplish the goal of reducing disruptive behavior overall.

- Appropriate school learning theory and educational philosophy is a strategy for preventing violence and promoting order and discipline in schools, put forward by educational philosopher Daniel Greenberg and practised by the Sudbury Valley School.

Detention

Detention is one of the most common punishments in schools in the United States, Britain, Ireland, Singapore, Canada, Australia and some other countries. It requires the pupil to remain in school during a specified time on a school day (such as lunch, recess or after school) -- or even to attend school on a non-school day, e.g. "Saturday detention" at some US and UK schools. In the UK, the Education Act 1997 obliges a school to give parents at least 24 hours' notice of a detention outside school hours.

Suspension

Suspension or temporary exclusion is mandatory leave assigned to a student as a form of punishment that can last anywhere from one day to several weeks, during which time the student cannot attend regular lessons. The student's parents/guardians are notified of the reason for and duration of the out-of-school suspension. Sometimes students have to complete work during their suspensions, for which they receive no credit. In American schools there are often two types of suspension: In-School Suspension (ISS) and Out-of-School Suspension (OSS). In-school suspension requires the student to report to school as normal, but sit in a special room all day. Out-of-school suspension suspends the student from being on school grounds.

www.numerons.in

Exclusion

Exclusion, expulsion, withdrawing or permanent exclusion is the removal of a student permanently from the school. This is the ultimate last resort, when all other methods of discipline have failed. However, in extreme situations, it may also be used for a single offense. Some education authorities have a nominated school in which all excluded students are collected; this typically has a much higher staffing level than mainstream schools. In some US public schools, expulsions and exclusions are so serious that they require an appearance before the Board of Education. In the UK, head teachers may make the decision to exclude, but the student's parents have the right of appeal to the local education authority. This has proved controversial in cases where the head teacher's decision has been overturned (and his or her authority thereby undermined), and there are proposals to abolish the right of appeal.

www.numerons.in

Expulsion from a private school is a more straightforward matter, since the school can merely terminate its contract with the parents.

Tactical ignoring

Tactical ignoring, also known as planned ignoring, is a behavioral management strategy used in response to challenging behavior that seeks to receive attention or to gain a reaction from others. It is a commonly used strategy when the person displaying the attention-seeking behavior still feels rewarded by a negative response. An example of this is a cough or noise that is excessively loud in order to gain sympathy from work colleagues, loved ones and friends, which is still seen as desirable attention by the person.

Tactical ignoring can be one element of a behavior management plan when there are a variety of challenging behaviors being addressed. As such, it is a method of responding to a behavior, complemented by a positive reinforcement schedule and skill development in learning a more appropriate method of seeking attention.

www.numerons.in

What is tactical ignoring?

Tactical ignoring is a strategy where a person gives no outward sign of recognizing a behavior, such as no eye contact, no verbal response and no physical response. However, the person remains aware of the behavior and monitors the individual to ensure their safety and the safety of others.

One of the principles of tactical ignoring is to analyse the behavior to see the message that is being communicated by the individual. This message, the need for attention or to gain a reaction, requires a response. The aim is to provide the child with positive and quality attention for displaying appropriate behaviors, or for not displaying the desired behavior. When the child displays the desired behavior in order to gain attention, it may be appropriate to tactically ignore the behavior. This strategy uses the same foundation as that underlying Positive behavior support and Applied Behavior Analysis in that positive behavior is encouraged with positive reinforcement, and unwanted behaviors are discouraged with ignoring or negative reinforcement.

www.numerons.in

Behaviors that suit tactical ignoring

In some cases, an individual's behavior occurs as a way of getting attention so the best strategy may be to ignore it. The positive consequence of the behavior is getting attention. When this is removed, it is assumed the behavior will eventually cease. While tactical ignoring may be used in conjunction with other techniques in a wide variety of situations, it is most commonly effective in responding to behaviors such as swearing, yelling and sulking.

www.numerons.in

Tactical ignoring paired with positive reinforcement

Proponents of tactical ignoring claim that it works best when linked with positive reinforcement. An example is when a child is throwing a tantrum to seek attention. In this case, a comforting hug or even a scolding gets the desired attention. However, the parent ignores the tantrum. When it has stopped, the child is immediately rewarded with praise, a treat or favorite activity. It pays to be very specific with positive reinforcement: "It's great when you are quiet" instead of "Good boy!"

Classroom management

Classroom management is a term used by teachers to describe the process of ensuring that classroom lessons run smoothly despite disruptive behavior by students. The term also implies the prevention of disruptive behavior. It is possibly the most difficult aspect of teaching for many teachers; indeed experiencing problems in this area causes some to leave teaching altogether. In 1981 the US National Educational Association reported that 36% of teachers said they would probably not go into teaching if they had to decide again. A major reason was "negative student attitudes and discipline".

www.numerons.in

According to Moskowitz & Hayman (1976), once a teacher loses control of their classroom, it becomes increasingly more difficult for them to regain that control. Also, research from

Berliner (1988) and Brophy & Good (1986) shows that the time that teacher has to take to correct misbehavior caused by poor classroom management skills results in a lower rate of academic engagement in the classroom. From the student's perspective, effective classroom management involves clear communication of behavioral and academic expectations, as well as a cooperative learning environment.

Classroom management is closely linked to issues of motivation, discipline and respect. Methodologies remain a matter of passionate debate amongst teachers; approaches vary depending on the beliefs a teacher holds regarding educational psychology. A large part of traditional classroom management involves behavior modification, although many teachers see using behavioral approaches alone as overly simplistic. Many teachers establish rules and procedures at the beginning of the school year. According to Gootman (2008), rules give students concrete direction to ensure that our expectation becomes a reality.

www.numerons.in

They also try to be consistent in enforcing these rules and procedures. Many would also argue for positive consequences when rules are followed, and negative consequences when rules are broken. There are newer perspectives on classroom management that attempt to be holistic. One example is affirmation teaching, which attempts to guide students toward success by helping them see how their effort pays off in the classroom. It relies upon creating an environment where students are successful as a result of their own efforts.

Techniques

Corporal punishment

www.numerons.in

Until recently, Corporal punishment was widely used as a means of controlling disruptive behavior but it is now no longer fashionable, though it is still advocated in some contexts by people such as James Dobson.

Rote discipline

Also known as `lines`, Rote Discipline is a negative sanction used for behavior management. It involves assigning a disorderly student sentences or the classroom rules to write repeatedly. Among the many types of classroom management approaches, it is very commonly used.

Preventative techniques

Preventative approaches to classroom management involve creating a positive classroom community with mutual respect between teacher and student. Teachers using the preventative approach offer warmth, acceptance, and support unconditionally - not based on a student's behavior. Fair rules and consequences are established and students are given frequent and consistent feedback regarding their behavior.

www.numerons.in

Preventative techniques also involve the strategic use of praise and rewards to inform students about their behavior rather than as a means of controlling student behavior. In order to use rewards to inform students about their behavior, teachers must emphasize the value of the behavior that is rewarded and also explain to students the specific skills they demonstrated to earn the reward. Teachers should also encourage student collaboration in selecting rewards and defining appropriate behaviors that will earn rewards.

Systematic Approaches

www.numerons.in

The Good Behavior Game

The Good Behavior Game (GBG) is a "classroom-level approach to behavior management" that was originally used in 1969 by Barrish, Saunders, and Wolf. The Game entails the class earning access to a reward or losing a reward, given that all members of the class engage in some type of behavior (or did not exceed a certain amount of undesired behavior). The GBG can be used to increase desired behaviors (e.g., question asking) or to decrease undesired behaviors (e.g., out of seat behavior). The GBG has been used with preschoolers as well as adolescents, however most applications have been used with typically developing students (i.e., those without developmental disabilities). In addition, the Game "is usually popular with and acceptable to students and teachers."

Discipline with Dignity

According to its founders, Discipline with Dignity is one of the most widely practiced behavior management philosophies in the world. Founded by Dr. Richard Curwin and Dr. Allen Mendler, the program is utilized in more than 12 different countries. Discipline with Dignity, provides an in-depth flexible approach for effective school and classroom management. With a strong focus on developing responsibility, it is a comprehensive, practical program that leads to improved student behavior through responsible thinking, cooperation, mutual respect, and shared decision-making.

Tools for Teaching

Tools for Teaching is a classroom management method created and taught by Fred Jones on speaking tours and in the eponymous book series

Positive Classrooms

Positive Classrooms developed by Dr. Robert DiGiulio sees positive classroom management as the result of four factors: how teachers regard their students (spiritual dimension), how they set up the classroom environment (physical dimension), how skillfully they teach content (instructional dimension), and how well they address student behavior (managerial dimension).

Assertive Discipline

Assertive discipline is another systematic approach of classroom management. Lee and Marlene Canter discuss the ideas behind this approach in several published books.

Discipline without Stress, Punishments or Rewards

Discipline without Stress (or DWS) is a K-12 discipline and learning approach developed by Dr. Marvin Marshall described in his 2001 book, Discipline without Stress, Punishments or Rewards. The approach is designed to educate young people about the value of internal motivation. The intention is to prompt and develop within youth a desire to become responsible and self-disciplined and to put forth effort to learn. The most significant characteristics of DWS are that it is totally noncoercive (but not permissive) and takes the opposite approach to Skinnerian behaviorism that relies on external sources for reinforcement.

A four part Teaching Model guides educators in the implementation of this approach. Foundational is the teaching of four concepts referred to as The Hierarchy of Social Development, which highlights the difference between internal and external motivation. Young people are taught that all behavior and motivation can be assigned to one of four levels and that all choices can be made consciously. With eight Significant Teaching Points in mind, students are taught to use the Hierarchy to guide self-reflection and self-evaluation, with the goal of making responsible choices and decisions in life. Students come to understand and experience that responsible behavior, motivated from the intention to "do the right thing simply because it is the right thing to do," is inherently satisfying.

www.numerons.in

Classroom management as time management

In their introductory text on teaching, Kauchak and Eggen (2008) explain classroom management in terms of time management. The goal of classroom management, to Kauchak and Eggen, is to not only maintain order but to optimize student learning. They divide class time into four overlapping categories, namely allocated time, instructional time, engaged time, and academic learning time.

Allocated time

Allocated time is the total time allotted for teaching, learning, and routine classroom procedures like attendance and announcements. Allocated time is also what appears on a student's schedule, for example "Introductory Algebra: 9:50-10:30 a.m." or "Fine Arts 1:15-2:00 p.m."

Instructional time

www.numerons.in

Instructional time is what remains after routine classroom procedures are completed. That is to say, instructional time is the time wherein teaching and learning actually takes place. Teachers may spend two or three minutes taking attendance, for example, before their instruction begins.

Engaged time

Engaged time is also called time on task. During engaged time, students participating actively in learning activities—asking and responding to questions, completing worksheets and exercises, preparing skits and presentations, etc.

Academic learning time

www.numerons.in

Academic learning time occurs when students 1) participate actively and 2) are successful in learning activities. Effective classroom management maximizes academic learning time.
Common mistakes in classroom behavior management

In an effort to maintain order in the classroom, sometimes teachers can actually make the problems worse. Therefore, it is important to consider some of the basic mistakes commonly made when implementing classroom behavior management strategies. For example, a common mistake made by teachers is to define the problem behavior by how it looks without considering its function.

Interventions are more likely to be effective when they are individualized to address the specific function of the problem behavior. Two students with similar looking misbehavior may require entirely different intervention strategies if the behaviors are serving different functions. Teachers need to understand that they need to be able to change the ways they do things from year to year, as the children change. Not every approach works for every child. Teachers need to learn to be flexible. Another common mistake is for the teacher to become increasingly frustrated and negative when an approach is not working.

www.numerons.in

The teacher may raise his or her voice or increase adverse consequences in an effort to make the approach work. This type of interaction may impair the teacher-student relationship. Instead of allowing this to happen, it is often better to simply try a new approach.

Inconsistency in expectations and consequences is an additional mistake that can lead to dysfunction in the classroom Teachers must be consistent in their expectations and consequences to help ensure that students understand that rules will be enforced. To avoid this, teachers should communicate expectations to students clearly and be sufficiently committed to the classroom management procedures to enforce them consistently.

Neuro-linguistic programming

www.numerons.in

Neuro-linguistic programming (NLP) is an approach to psychotherapy and organizational change based on "a model of interpersonal communication chiefly concerned with the relationship between successful patterns of behaviour and the subjective experiences (esp. patterns of thought) underlying them" and "a system of alternative therapy based on this which seeks to educate people in self-awareness and effective communication, and to change their patterns of mental and emotional behaviour".

The co-founders, Richard Bandler and linguist John Grinder, believed that NLP would be useful in "finding ways to help people have better, fuller and richer lives". They coined the term "Neuro-Linguistic Programming" to emphasize their belief in a connection between the neurological processes ("neuro"), language ("linguistic") and behavioral patterns that have been learned through experience ("programming") and can be organized to achieve specific goals in life.

www.numerons.in

In early workshops by Bandler and Grinder and in books that followed, it was often claimed that through the use of NLP, problems especially phobias could be overcome in a single short session whereas traditional therapies would have taken weeks, or even months of regular sessions to make progress. It was claimed that NLP was capable of addressing the full range of problems that psychotherapists are likely to encounter, such as phobias, depression, habit disorder, psychosomatic illnesses, and learning disorders. The founders advocated the potential for self-determination through overcoming learned limitations and emphasized well-being and healthy functioning. Bandler and Grinder claimed that if the effective patterns of behaviour of outstanding therapists (and other exceptional communicators) could be modeled then these patterns could be acquired by others. NLP has been adopted by private psychotherapists worldwide, including hypnotherapists, who undertake training in NLP and apply it to their practice. Later, it was promoted as a "science of excellence", derived from the study or "modeling" of how successful or outstanding people in different fields obtain their results. NLP has gained popularity within management training, life coaching, and the self-help industry.

www.numerons.in

Research in NLP has declined since the 1980s where empirical testing showed that NLP contains numerous exaggerated claims and conceptual errors, and failed to produce reliable results for the claims for effectiveness made by its originators and proponents. Critics have stated that NLP exhibits pseudoscientific characteristics, title, concepts and terminology. NLP was rated between possibly discredited and probably discredited by a 2006 polling of psychology experts.

History and founding

According to psychiatrist Robert Spitzer, NLP originated when Richard Bandler, a student at the University of California, Santa Cruz, was listening to and selecting portions of taped therapy sessions of the late Gestalt therapist Fritz Perls as a project for Robert Spitzer. Bandler believed he recognized particular word and sentence structures which facilitated the acceptance of Perls' therapeutic suggestions. Bandler took this idea to one of his university lecturers, John Grinder, a linguist. Together they studied Perls's utterances on tape and observed a second therapist, Virginia Satir, to produce what they termed the meta model, a model for gathering information and challenging a client's language and underlying thinking.

www.numerons.in

The meta model was presented in 1975 in two volumes, The Structure of Magic I: A Book About Language and Therapy and The Structure of Magic II: A Book About Communication and Change, in which the authors expressed their belief that the therapeutic "magic" as

performed in therapy by Perls and Satir, and by performers in any complex human activity, had structure that could be learned by others given the appropriate models. They believed that implicit in the behavior of Perls and Satir was the ability to challenge distortion, generalization and deletion in a client's language. The linguistic aspects were based in part on previous work by Grinder using Noam Chomsky's transformational grammar.

Challenging linguistic distortions, specifying generalizations, and recovery of deleted information in the client utterances, the surface structure, was supposed to yield a more complete representation of the underlying deep structure, and to have therapeutic benefit. They drew ideas from Gregory Bateson and Alfred Korzybski, particularly about human modeling and ideas associated with their expression, "the map is not the territory".

www.numerons.in

Satir and Bateson each wrote a preface to Bandler and Grinder's The Structure of Magic Volumes I & II. Bateson also introduced the pair to Milton Erickson who became their third model. Erickson also wrote a preface to Bandler and Grinder's two-volume book series based on their observations of Erickson working with clients, Patterns of the Hypnotic Techniques of Milton H. Erickson, Volumes I & II. These volumes also focused on the language patterns and some non-verbal patterns that Bandler and Grinder believed they observed in Erickson. While the meta model is intentionally specific, the Milton model was described as "artfully vague" and metaphoric — the inverse of the meta model. It was used in combination with the meta model as a softener, to induce trance, and to deliver indirect therapeutic suggestion. In addition to the first two models, Bandler, Grinder and a group of students who joined them during the early period of development of NLP, proposed other models and techniques, such as anchoring, reframing, submodalities, perceptual positions, and representational systems.

www.numerons.in

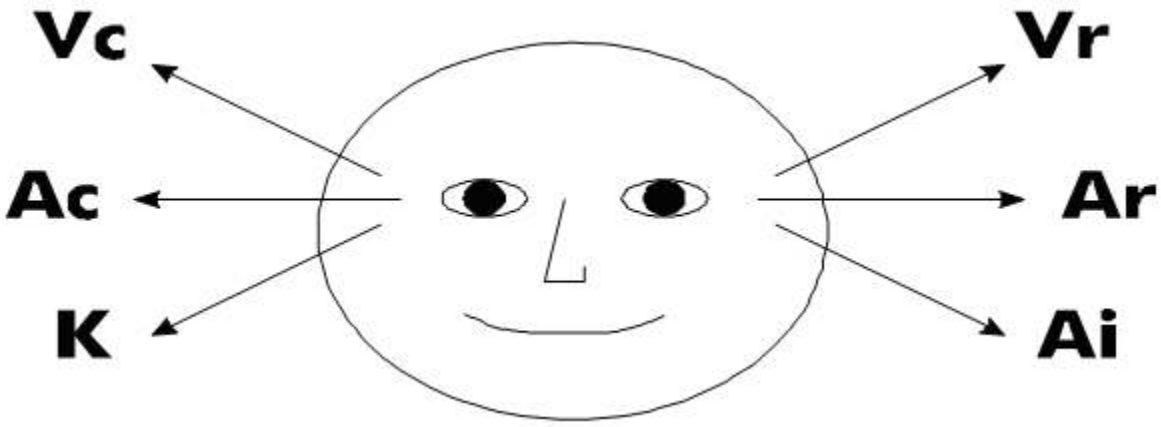
At the time, the human potential movement was developing into an industry; at the centre of this growth was the Esalen Institute at Big Sur, California. Perls had led numerous Gestalt therapy seminars at Esalen. Satir was an early leader and Bateson was a guest teacher. Bandler and Grinder claimed that in addition to being a therapeutic method, NLP was also a study of communication, and by the late 1970s Grinder and Bandler were marketing it as a business tool, claiming that "if any human being can do anything, so can you". After 150 students paid $1,000 each for a ten-day workshop in Santa Cruz, California, Bandler and Grinder gave up academic writing and produced popular books from seminar transcripts, such as Frogs into Princes, which sold more than 270,000 copies. According to court documents, Bandler made more than $800,000 in 1980 from workshop and book sales.

Techniques or set of practices

www.numerons.in

According to one study by Steinbach (1984), a classic interaction in NLP can be understood in terms of several major stages including establishing rapport, gathering information about a problem state and desired goals, using specific tools and techniques to make interventions, and integrating proposed changes into the client's life. The entire process is guided by the non-verbal responses of the client. The first is the act of establishing and maintaining rapport between the practitioner and the client which is achieved through

pacing and leading the verbal (e.g. sensory predicates and keywords) and non-verbal behaviour (e.g. matching and mirroring non-verbal behavior, or responding to eye movements - see chart) of the client.



An "eye accessing cue chart" as it appears in Bandler & Grinder's Frog into Princes (1979)

Once rapport is established, the practitioner may gather information (e.g. using the meta model questions) about the client's present state as well help the client define a desired state or goal for the interaction. The practitioner pays particular attention to the verbal and non-verbal responses as the client defines the present state and desired state and any resources that may be required to bridge the gap. The client is typically encouraged to consider the consequences of the desired outcome may have on his or her personal or professional life and relationships taking into account any positive intentions of any problems that may arise (i.e. ecological check). Fourth, assisting the client in achieving the desired outcomes by using certain tools and techniques to change internal representations and responses to stimuli in the world. Other tools and techniques include indirect suggestion from the Milton model, reframing, and submodalities. Finally, the changes are "future paced" by helping the client to mentally rehearse and integrate the changes into the his or her life. For example, the client may be asked to "step into the future" and represent (mentally see, hear and feel) what it is like having already achieved the outcome.

www.numerons.in

According to Stollznow (2010), "NLP also involves fringe discourse analysis and “practical” guidelines for “improved” communication. For example, one text asserts “when you adopt the “but” word, people will remember what you said afterwards. With the “and” word, people remember what you said before and after”.

Applications

Psychotherapeutic

www.numerons.in

The early books about NLP had a psychotherapeutic focus especially given that the early models were psychotherapists. As an approach to psychotherapy, NLP shares similar core assumptions and foundations in common with some contemporary brief and systemic practices, such as solution focused brief therapy. NLP has also been acknowledged as

having influenced these practices with its reframing techniques which seeks to achieve behaviour change by shifting its context or meaning, for example, by finding the positive connotation of a thought or behaviour.

The two main therapeutic uses of NLP are: (1) use as an adjunct by therapists practicing in other therapeutic disciplines, and (2) as a specific therapy called Neurolinguistic Psychotherapy which is recognized by the United Kingdom Council for Psychotherapy with accreditation governed at first by the Association for Neuro Linguistic Programming and more recently by its daughter organization the Neuro Linguistic Psychotherapy and Counselling Association.

www.numerons.in

Other uses

While the original goals of neuro-linguistic programming were therapeutic, the patterns have also been adapted for use outside psychotherapy for interpersonal communications and persuasion including business communication, management training, sales, sports, and interpersonal influence, used for coaching, team building, public speaking, negotiation, and communication. The UK Chartered Institute of Personnel and Development includes a number of NLP courses including an application of NLP to coaching in its 2010 training programme. A range of books have been published related to the application of NLP to coaching.

Criticism and controversy

Empirical validity

www.numerons.in

In the early 1980s, NLP was hailed as an important advance in psychotherapy and counseling, and attracted some interest in counseling research and clinical psychology. In the mid-1980s, reviews in The Journal of Counseling Psychology and by the National Research Council (1988; NRC) committee found little or no empirical basis for the claims about preferred representational systems (PRS) or assumptions of NLP. In an article published in 2005, psychologist Grant Devilly stated that at the time it was introduced, NLP was heralded as a breakthrough in therapy, and advertisements for training workshops, videos and books began to appear in trade magazines. The workshops provided certification. However, controlled studies shed such a poor light on the practice, and those promoting the intervention made such extreme and changeable claims that researchers began to question the wisdom of researching the area further, suggesting that it was an untestable theory.

The experimental research that does exist was mostly done in the 1980s and 1990s. It consisted of laboratory experimentation testing Bandler and Grinder's hypotheses that a person's preferred sensory mode of thinking can be revealed by observing eye movement cues and sensory predicates in language use. A research review conducted by Christopher Sharpley which focused on preferred representational systems, in 1984, followed by another review in 1987 in response to a critique published by Einspruch and Forman, concluded that there was little evidence for its usefulness as an effective counseling tool.

www.numerons.in

Reviewing the literature in 1988, Michael Heap also concluded that objective and fair investigations had shown no support for NLP claims about "preferred representational systems".

A research committee working for the United States National Research Council led by Daniel Druckman came to two conclusions. First, the committee "found little if any" evidence to support NLP's assumptions or to indicate that it is effective as a strategy for social influence. "It assumes that by tracking another's eye movements and language, an NLP trainer can shape the person's thoughts, feelings, and opinions (Dilts, 1983). There is no scientific support for these assumptions." Secondly, the committee members "were impressed with the modeling approach used to develop the technique. The technique was developed from careful observations of the way three master psychotherapists conducted their sessions, emphasizing imitation of verbal and nonverbal behaviors... This then led the committee to take up the topic of expert modeling in the second phase of its work."(Druckman, 2004) Von Bergen et al. (1997) state that "the most telling commentary on NLP may be that in the latest revision of his text on enhancing human performance, Druckman (Druckman & Bjork 1991) omitted all reference to Neurolinguistic Programming." These studies, in particular Sharpley's literature review, marked a decline in empirical research of NLP, and particularly in matching sensory predicates and its use in counsellor-client relationship in counseling psychology.

www.numerons.in

NLP practitioners and academics Tosey and Mathison have argued that the experimental approach is not always appropriate for researching NLP, instead proposing that NLP should be researched phenomenologically. Gareth Roderique-Davies (2009) stated that "Phenomenological research is free from hypotheses, pre-conceptions and assumptions, and seeks to describe rather than explain. Given the claims made by proponents of NLP, this adds little to the credibility debate and would produce reports concerning the experience from the perspective of the individual rather than confirmation of the claimed efficacy. The fact remains that NLP proponents make specific claims about how NLP works and what it can do and this compels providing evidence to substantiate these claims." He argued that the proposal to conduct phenomenology research using NLP modeling "constitutes an admission that NLP does not have an evidence base and that NLP practitioners are seeking a post-hoc credibility."

www.numerons.in

Scientific criticism

Criticism of NLP extends beyond a lack of reliable experimental evidence to support its claimed effectiveness. The title of "neuro-linguistic programming", has been described as pseudo-scientific because the claims, concepts and terminology may appear scientific but are not grounded in scientific research. NLP appeared on list of discredited psychological interventions in related research that investigates what does not work.

www.numerons.in

The title of NLP has been characterized as a pseudo-scientific. Witkowski (2010) writes that "NLP represents pseudoscientific rubbish, which should be mothballed forever." Roderique-Davies (2009) states that "neuro" in NLP is "effectively fraudulent since NLP offers no explanation at a neuronal level and it could be argued that its use fallaciously

feeds into the notion of scientific credibility". Witkowski (2010) also states that at the neuronal level NLP provides no explanation at all and has nothing in common with academic linguistics or programming. Similarly, experimental psychologist Corballis (1999) in his critique of lateralization of brain function (the left/right brain myth), states that "NLP is a thoroughly fake title, designed to give the impression of scientific respectability".

Witkowski (2010) states that NLP uses impressive sounding yet questionable expressions such as; pragmagraphics, surface structure, deep structure, accessing cues, non-accessing movement etc. Canadian skeptic and psychologist Barry Beyerstein (1995) also says that NLP contains terms such as, eye accessing cues, the metamodeling, metaprogramming, neurological levels, representational systems, and submodalities, intended to obfuscate and to give false impression of a scientific discipline. He says "though it claims neuroscience in its pedigree, NLP's outmoded view of the relationship between cognitive style and brain function ultimately boils down to crude analogies." Furthermore Beyerstein (1995) believed that NLP has helped popularize myths about the brain and neurology. He believes that the aphorism, “you create your own reality”, promotes a relativistic perspective and only seeks to gain immunity from scientific testing.

Clinical psychologist Grant Devilly (2005) identified NLP as an early example of a power therapy. Devilly claims that these so called power therapies share characteristics of pseudo-science including: the promotion of unobtainable goals, rationalization traps, manufactured credibility, a set of specific beliefs, self generated persuasion, vivid appeals, the use of common misconceptions, and attacks on critics through the use of innuendo.

www.numerons.in

NLP has been criticized alongside theories and practices characterized as questionable, pseudoscience and/or discredited practices in therapy. Sources within therapy and psychology include books such as Crazy Therapies: What Are They? Do They Work? (1997), Science and Pseudo-science in Clinical Psychology (2002), and Tall Tales about the Mind and Brain (2007). Articles critical of NLP also appear in the Encyclopedia of Pseudoscience (2000), and The Skeptic's Dictionary (2003). NLP has more recently been used as a key example of pseudo-science to facilitate the understanding of the importance of rational and critical thinking in a number of academic subjects. Lilienfeld et al (2001), Lum (2001), and Dunn et al (2008) have used NLP as an example of pseudo-science for teaching undergraduates how to identify pseudo-scientific psychological interventions.

According to Witkowski (2010), NLP also appears on “the list of discredited therapies” published in the journal of Professional Psychology: Research and Practice. With reference to work by Carroll (2003), Della Sala (1999), Lilienfeld et al (2003) and Singer and Lalich (1996) on “pseudoscientific, unvalidated, or “quack” psychotherapies” within clinical psychology, Norcross et al. included NLP for treatment of mental/behaviour disorders in a survey of the opinions of psychologists who rated NLP between possibly discredited and probably discredited, a rating similar to dolphin assisted therapy, equine therapy, psychosynthesis, scared straight programs, and emotional freedom technique (EFT). Norcross et al. in their Clinician's Guide to Evidence-based Practices listed “neurolinguistic programming for drug and alcohol dependence” seventh out of their list of the ten most

discredited drugs and alcohol interventions, and it is listed as “certainly discredited” in Evidence-based practices in addiction treatment: review and recommendations for public policy (Fala et al. 2008 as cited by Glasner-Edwards and Rawson, 2010).

Intellectual property disputes

In the 1980s, shortly after publishing Neuro-Linguistic Programming: Volume I with Robert Dilts and Judith Delozier, Grinder and Bandler fell out. Amidst acrimony and intellectual property lawsuits, the NLP brand was adopted by other training organizations. Some time afterwards, John Grinder collaborated with various people to develop a form of NLP called the New Code of NLP which claimed to restore a whole mind-body systemic approach to NLP New code of Neuro-linguistic programming (New code of NLP) is a revised framework for the teaching and delivery of NLP patterns. It was developed in the early and mid-80's. Grinder has described the new code as an attempt to address several design flaws that were observed in the classic coding. Richard Bandler also published new processes based on submodalities and Ericksonian hypnosis.

In July 1996, after many years of legal controversy, Bandler filed a lawsuit against John Grinder and others, claiming retrospective sole ownership of NLP, and also the sole right to use the term under trademark. At the same time, Tony Clarkson (a UK practitioner) successfully asked the UK High Court to revoke Bandler's UK registered trademark of "NLP", in order to clarify legally that "NLP" was a generic term rather than intellectual property.

Despite the NLP community's being splintered, most NLP material acknowledges the early work of co-founders Bandler and Grinder, as well as the development group that surrounded them in the 1970s. In June 2001, the lawsuits were settled with Bandler and Grinder agreeing to be known as co-founders of NLP.

Associations, certification and practitioner standards

As NLP evolved, and the applications began to be extended beyond therapy, new ways of training were developed and the course structures and design changed. Course lengths and style vary from institute to institute. In the 1990s, following attempts to put NLP on a regulated footing in the UK, other governments began certifying NLP courses and providers; for example, in Australia, a Graduate Certificate in Neuro-linguistic programming is accredited under the Australian Qualifications Framework. However, NLP continues to be an open field of training with no "official" best practice. With different authors, individual trainers and practitioners having developed their own methods, concepts and labels, often branding them as "NLP", the training standards and quality differ greatly. The multiplicity and general lack of controls has led to difficulty discerning the comparative level of competence, skill and attitude in different NLP trainings and has resulted in NLP getting associated with cults like scientology, and getting labeled in unfavorable political ways (nazilinguistic programming). According to Peter Schütz, the length of training in Europe varies from 2–3 days for the hobbyist to 35–40 days over at least nine months to achieve a professional level of competence.

www.numerons.in

In 2001, neuro-linguistic psychotherapy, a derivative of NLP, was recognized by the United Kingdom Council for Psychotherapy as an experimental constructivist form of psychotherapy.

Today, there are many competing organisations offering varying forms of NLP training and certification in what can be a lucrative business. The Guardian reported that in 2006 that a seven day course by Paul McKenna's company for 600 delegates produced £1m of revenue. Many variants of the practice are found in seminars, workshops, books and audio programs in the form of exercises and principles intended to influence behavioral and emotional change in self and others. There is great variation in the depth and breadth of training and standards of practitioners, and some disagreement between those in the field about which patterns are, or are not, "NLP".

www.numerons.in

The Institutes for the Achievement of Human Potential

The Institutes for The Achievement of Human Potential is a non-profit organization providing teaching programs and literature which it promotes as improving the health and neurological development of normal children and of children who have sustained a brain injury.

Although the institute's programs were supported by some notable individuals such as Linus Pauling (1901–1994) and Raymond Dart (1893–1988), their programs for brain injured children have been widely criticized. According to the American Academy of Pediatrics, the institute's patterning treatment is based on an outmoded and oversimplified theory of brain development, its effectiveness is not supported by evidence-based medicine, and its use is unwarranted.

www.numerons.in

IAHP has its own journal titled In-Report, which publishes results that are to be shared among fellow professionals.

History

Founded in 1955, the Institutes for The Achievement of Human Potential (IAHP, also known as "The Institutes") is located in a suburb of northwest Philadelphia, Pennsylvania. The founder, Glenn Doman (a physical therapist), together with Carl Delacato (an educational psychologist), developed an approach to treating children with brain injury, published in 1960 in the Journal of the American Medical Association (JAMA). Glenn Doman received his degree in Physical Therapy from the University of Pennsylvania in 1940. Their work drew heavily on the ideas of Temple Fay (a neurophysiologist), who was head of the Department of Neurosurgery at Temple University Medical School and president of the Philadelphia Neurological Society. Fay believed that the infant brain evolves (as with evolution of the species) through stages of development similar to a fish, a reptile, a mammal and finally a human. This idea, encapsulated as "ontogeny recapitulates phylogeny", also known as the recapitulation theory, is considered obsolete by modern

www.numerons.in

mainstream biologists. The IAHP claim that brain injury at a given level of neurological development prevents further progress. The IAHP states that its therapies are based on the theory of neuroplasticity, or the brain's inherent ability to grow both functionally and anatomically. It claims that traditional medicine has attempted to treat brain injured children by medicating them, and that such medications can have negative side effects. The IAHP claims that due to neuroplasticity, their programs of increased sensory stimulation can actually physically grow the brain and produce improved neurological function in their patients. Another aspect of the IAHP's theories is that a lack of oxygen to the brain is a key cause of many problems in brain-injured children. The IAHP asserts that their program includes techniques that improve this oxygen supply, and that increased oxygen to the brain will help their patients recover.

www.numerons.in

Glenn Doman published the book What To Do About Your Brain-Injured Child in 1974, which describes the ideas and techniques used by IAHP. The subtitle of the book or your Brain-damaged, Mentally Retarded, Mentally Deficient, Cerebral-Palsied, Epileptic, Autistic, Athetoid, Hyperactive, Attention Deficit Disordered, Developmentally Delayed, Down's Child lists the many conditions the author regards as being encompassed by "brain injured" – the term favoured by IAHP. Since 1964, Glen Doman (later also Janet and Douglas Doman) has published a number of books in the "Gentle Revolution Series", a line of books for parents of normal children, covering topics such as reading, math, intelligence, and swimming. Programs for "well children" are a significant aspect of the IAHP's promotional material, literature and web site.

IAHP Programs

www.numerons.in

Programs for brain-injured children

Before initiation of an IAHP program with their "brain-injured" children, parents attend a five day seminar that the IAHP presents called the "What To Do About Your Brain-Injured Child Course". The IAHP states that this course gives a good basis of understanding of their programs to parents. This course is presented in Philadelphia, Italy, Japan, Mexico, and Singapore.

The program for "brain-injured" children includes:

- Patterning – manipulation of limbs and head in a rhythmic fashion
- Creeping – forward bodily movement with the abdomen in contact with the floor
- Crawling – forward bodily movement with the abdomen raised from the floor
- Receptive stimulation – visual, tactile and auditory stimulation
- Expressive activities – e.g. picking up objects
- Masking – breathing into a rebreathing mask to increase the amount of carbon dioxide inhaled, which is believed to increase cerebral blood flow
- Brachiation – swinging from a bar or vertical ladder
- Gravity/Antigravity activities – rolling, somersaulting and hanging upside down.

www.numerons.in

(The above is taken from Understanding Mental Retardation, page 185-186.)

The program is designed to be used by a parent at home. Patterning is perhaps the key technique. IAHP state "if we have to put everything we do on one hook, patterning is really not a bad place to hang our hat" and "that if these patterns were applied rigorously, on a specific schedule, and done with a religious zeal, brain-injured kids improved." They believe the order of brain development occurs as higher brain stages are successively brought into play.

www.numerons.in

Programs for well children

The IAHP also provides programs and literature to the parents of well children. Glenn Doman believes that because the neurological development of brain injured children could be speeded, that the same should be true of well children. The IAHP provides a series of books and early education kits called the "Gentle Revolution Series", which state that their use will accelerate development of well children. For example, one program is "How to teach your baby to read".

The IAHP teaches a week-long seminar called the "How To Multiply Your Baby's Intelligence Course", which provides demonstrations of children taught with the IAHP's methods. The IAHP claims that at the course, "parents learn how to teach their children to read, how to learn a foreign language...mathematics, and music appreciation. Parents learn about sensory and motor development and the fundamentals of a good nutritional program for the family."

www.numerons.in

Epilepsy treatment

The IAHP requires that all brain-injured children be gradually weaned off anticonvulsants. They claim that seizures are a "natural reflex defense response to a lethal threat to the brain", but that the seizures themselves are not directly harmful to the brain. Instead of placing children on anticonvulsant medications, the IAHP claims that resources should be directed at "developing methods and bioactive agents that promote neuroplasticity", the brain's ability to grow and change. The IAHP asserts that status epilepticus can be caused by anticonvulsants and may be best left untreated by them. Instead, they believe that seizures can be reduced or eliminated by a "masking" program, which they claim periodically reduces oxygen intake and increases carbon dioxide intake. The IAHP also claims that seizures can be reduced by decreasing intake of salt and fluids, supplements of magnesium calcium and pyridoxine, and a healthy diet and environment.

Scientific criticism

www.numerons.in

The American Academy of Pediatrics Committee on Children With Disabilities issued warnings regarding patterning, one of the IAHP's therapies for brain injured children, as early as 1968 and repeated in 1982. Their latest cautionary policy statement was in 1999, which was reaffirmed in 2002 and 2005. It stated:

This statement reviews patterning as a treatment for children with neurologic impairments. This treatment is based on an outmoded and oversimplified theory of brain development. Current information does not support the claims of proponents that this treatment is efficacious, and its use continues to be unwarranted.... [T]he demands and expectations placed on families are so great that in some cases their financial resources may be depleted substantially and parental and sibling relationships could be stressed.

Since 1960 the IAHP has published multiple studies professing to show the effectiveness of the program. These studies, upon review, have not stood up to scientific scrutiny and have not been reproduced by other sources. In 1978, Sara Sparrow (professor emerita and senior research scientist at Yale Child Study Center) and Edward Zigler (professor emeritus at the Department of Psychology at Yale University, one of the principle architects of the US federal Head Start program and recipient of the 2008 APA Award For Outstanding Lifetime Contribution To Psychology) evaluated patterning as a treatment for retarded children. They concluded that no evidence was found for an improvement over that which would be expected of children given attention or that expected of any child as they mature; the patterning method cannot be recommended for seriously retarded children. Zigler wrote a 1981 editorial entitled "A plea to end the use of the patterning treatment for retarded children", which emphasized the harmful effect the treatment has by raising false hopes and increasing parental guilt. According to Edward Zigler and Robert Hodapp, in their book Understanding Mental Retardation, the Doman-Delacto method has major flaws:

- The recapitulation theory it is built upon has been discarded by the natural sciences.
- The suggestion that motor development has stages, which depend on earlier developments, is not supported by evidence.
- There is no evidence that passive movements by a child, forced to engage in crawling movements, affects neurological organization.
- Children who voluntarily perform an activity (such as sitting or walking) before mastering preceding stages, are prevented from doing so by the IAHP—possibly harming the child.
- The only scientific paper published by Doman on patterning (in 1960) contains many methodological errors and overstatements of findings. The study had no control group so was unable to compare with children who would naturally show some developmental progress over time. When independent scientists compared the results with the progress made by untreated children, the "results of patterning appear singularly unimpressive".
- The patterning procedure may be harmful to its participants (the parents experience guilt at being unable to achieve the intensive program required) and other family members through neglect.
- It is cruel to offer hope through a program that is impossible to fully carry out.

www.numerons.in

In addition to the American Academy of Pediatrics, a number of other organizations have issued cautionary statements about claims for efficacy of this therapy. These include the executive committee of the American Academy for Cerebral Palsy, the United Cerebral Palsy Association of Texas, the Canadian Association for Retarded Children the executive

board of the American Academy of Neurology, and the American Academy of Physical Medicine and Rehabilitation.

A 2006 retrospective study of 21 children by the IAHP and others of children with cortical visual impairment found significant improvement after use of the program; the study had no control group and has not been replicated.

Kathleen Ann Quill, in her book Teaching children with autism: What parents want, says "thousands of families have wasted time and money to follow Doman's methods." She goes on to say "Professionals have nothing to learn from Doman's pseudoscientific treatments, but they have plenty to learn from his marketing strategy", which is aimed at parent's "hopes and fantasies".

Martha Farrell Erickson and Karen Marie Kurz-Riemer discuss Early Intervention with "Normal Infants and Toddlers" in their book "Infants Toddlers and Families". They claim Doman "capitalized on the desires of members of the "baby boom" generation to maximise their children's intellectual potential" and "encouraged parents to push their infants to develop maximum brain power". However his programs were "based on shaky or nonexistent research evidence" and "most child development experts at the time described many aspects of the program as useless and perhaps even harmful."

Martin Robards also cites widespread criticism in his book Running a Team for Disabled Children and Their Families but concedes that Doman and Delacato caused paediatricians and therapists to recognize that early intervention programs are needed.

www.numerons.in

Steven Novella, assistant professor of Neurology at Yale University School of Medicine, criticized the technique as follows:

> The Doman-Delacato patterning technique is premised on a bankrupt and discarded theory and has failed when tested under controlled conditions. Its promotion with unsubstantiated claims can cause significant financial and emotional damage. Such claims can instill false hope in many people who are already plagued by guilt and depression, setting them up for a further disappointment, guilt, and feelings of inadequacy. The process can also waste their time, energy, emotion, and money. These resources may be taken away from their children. Parents can also be distracted from dealing with the situation in other practical ways and coping psychologically as a family with the reality of having a brain-injured or mentally retarded child. Parents are encouraged, in fact, to remain in a state of denial while they are pursuing a false cure.

Notable supporters

www.numerons.in

A few notable individuals have expressed support for the IAHP.

Physicist Linus Pauling presented a talk on the "Orthomolecular enhancement of human development" in 1978 at a conference on human neurological development co-sponsored by the IAHP. In his opening remarks, he praised his hosts: "I admire the work that has been

done in these Institutes very much. I know that considerable emphasis is placed on good nutrition for the people who come to the Institutes and that large doses of vitamin C are given to them."

Anthropologist Raymond Dart spent the last 20 years of his life dividing his time between South Africa and the IAHP. Dart supported the "ontogeny recapitulates phylogeny" premise behind the IAHP's work. Dart stated that "the development of the individual does, indeed, recapitulate the evolution of the species."

www.numerons.in

Actress Liza Minnelli served on their board of directors for some time and appeared in their commercials.

E-learning

E-learning comprises all forms of electronically supported learning and teaching. The information and communication systems, whether networked learning or not, serve as specific media to implement the learning process. The term will still most likely be utilized to reference out-of-classroom and in-classroom educational experiences via technology, even as advances continue in regard to devices and curriculum.

E-learning is essentially the computer and network-enabled transfer of skills and knowledge. E-learning applications and processes include Web-based learning, computer-based learning, virtual education opportunities and digital collaboration. Content is delivered via the Internet, intranet/extranet, audio or video tape, satellite TV, and CD-ROM. It can be self-paced or instructor-led and includes media in the form of text, image, animation, streaming video and audio.

www.numerons.in

Abbreviations like CBT (Computer-Based Training), IBT (Internet-Based Training) or WBT (Web-Based Training) have been used as synonyms to e-learning. Today one can still find these terms being used, along with variations of e-learning such as elearning, Elearning, and eLearning. The terms will be utilized throughout this article to indicate their validity under the broader terminology of E-learning.

Market

The worldwide e-learning industry is estimated to be worth over $48 billion according to conservative estimates. Developments in internet and multimedia technologies are the basic enabler of e-learning, with consulting, content, technologies, services and support being identified as the five key sectors of the e-learning industry.

Higher education

www.numerons.in

By 2006, 3.5 million students were participating in on-line learning at institutions of higher education in the United States. According to the Sloan Foundation reports, there has been an increase of around 12–14 percent per year on average in enrollments for fully online

learning over the five years 2004–2009 in the US post-secondary system, compared with an average of approximately 2 per cent increase per year in enrollments overall. Allen and Seamen (2009) claim that almost a quarter of all students in post-secondary education were taking fully online courses in 2008, and a report by Ambient Insight Research suggests that in 2009, 44 per cent of post-secondary students in the USA were taking some or all of their courses online, and projected that this figure would rise to 81 percent by 2014. Thus it can be seen that e-learning is moving rapidly from the margins to being a predominant form of post-secondary education, at least in the USA.

www.numerons.in

Many higher education, for-profit institutions, now offer on-line classes. By contrast, only about half of private, non-profit schools offer them. The Sloan report, based on a poll of academic leaders, indicated that students generally appear to be at least as satisfied with their on-line classes as they are with traditional ones. Private institutions may become more involved with on-line presentations as the cost of instituting such a system decreases. Properly trained staff must also be hired to work with students on-line. These staff members need to understand the content area, and also be highly trained in the use of the computer and Internet. Online education is rapidly increasing, and online doctoral programs have even developed at leading research universities.

K-12 Learning

E-learning is also utilized by public K-12 schools in the United States. Some E-Learning environments take place in a traditional classroom, others allow students to attend classes from home or other locations. There are several states that are utilizing cyber and virtual school platforms for E-learning across the country that continued to increase. Virtual school enable students to log into synchronous learning or asynchronous learning courses anywhere there is an internet connection. Technology kits are usually provided that include computers, printers, and reimbursement for home internet use. Students are to use technology for school use only and must meet weekly work submission requirements. Teachers employed by K-12 online public cyber schools must be certified teachers in the state they are teaching in. Cyber schools allow for students to maintain their own pacing and progress, course selection, and provides the flexibility for students to create their own schedule.

www.numerons.in

History

In the early 1960s, Stanford University psychology professors Patrick Suppes and Richard C. Atkinson experimented with using computers to teach math and reading to young children in elementary schools in East Palo Alto, California. Stanford's Education Program for Gifted Youth is descended from those early experiments.

www.numerons.in

Early e-learning systems, based on Computer-Based Learning/Training often attempted to replicate autocratic teaching styles whereby the role of the e-learning system was assumed to be for transferring knowledge, as opposed to systems developed later based on Computer Supported Collaborative Learning (CSCL), which encouraged the shared development of knowledge.

As early as 1993, William D. Graziadei described an online computer-delivered lecture, tutorial and assessment project using electronic mail. In 1997 he published an article which described developing an overall strategy for technology-based course development and management for an educational system. He said that products had to be easy to use and maintain, portable, replicable, scalable, and immediately affordable, and they had to have a high probability of success with long-term cost-effectiveness.

www.numerons.in

William D. Graziadei, Sharon Gallagher,Ronald N. Brown,Joseph Sasiadek Building Asynchronous and Synchronous Teaching-Learning Environments: Exploring a Course/Classroom Management System Solution </ref> In 1997 Graziadei, W.D., et al., published an article entitled "Building Asynchronous and Synchronous Teaching-Learning Environments: Exploring a Course/Classroom Management System Solution". They described a process at the State University of New York (SUNY) of evaluating products and developing an overall strategy for technology-based course development and management in teaching-learning. The product(s) had to be easy to use and maintain, portable, replicable, scalable, and immediately affordable, and they had to have a high probability of success with long-term cost-effectiveness. Today many technologies can be, and are, used in e-learning, from blogs to collaborative software, ePortfolios, and virtual classrooms. Most eLearning situations use combinations of these techniques.

E-Learning 2.0

www.numerons.in

The term E-Learning 2.0 is a neologism for CSCL systems that came about during the emergence of Web 2.0 From an E-Learning 2.0 perspective, conventional e-learning systems were based on instructional packets, which were delivered to students using assignments. Assignments were evaluated by the teacher. In contrast, the new e-learning places increased emphasis on social learning and use of social software such as blogs, wikis, podcasts and virtual worlds such as Second Life. This phenomenon has also been referred to as Long Tail Learning See also (Seely Brown & Adler 2008)

E-Learning 2.0, by contrast to e-learning systems not based on CSCL, assumes that knowledge (as meaning and understanding) is socially constructed. Learning takes place through conversations about content and grounded interaction about problems and actions. Advocates of social learning claim that one of the best ways to learn something is to teach it to others.

www.numerons.in

However, it should be noted that many early online courses, such as those developed by Murray Turoff and Starr Roxanne Hiltz in the 1970s and 80s at the New Jersey Institute of Technology, courses at the University of Guelph in Canada, the British Open University, and the online distance courses at the University of British Columbia (where Web CT, now incorporated into Blackboard Inc. was first developed), have always made heavy use of online discussion between students. Also, from the start, practitioners such as Harasim (1995) have put heavy emphasis on the use of learning networks for knowledge construction, long before the term e-learning, let alone e-learning 2.0, was even considered.

There is also an increased use of virtual classrooms (online presentations delivered live) as an online learning platform and classroom for a diverse set of education providers such as Minnesota State Colleges and Universities and Sachem School District.

In addition to virtual classroom environments, social networks have become an important part of E-learning 2.0. Social networks have been used to foster online learning communities around subjects as diverse as test preparation and language education. Mobile Assisted Language Learning (MALL) is a term used to describe using handheld computers or cell phones to assist in language learning. Some feel, however, that schools have not caught up with the social networking trends. Few traditional educators promote social networking unless they are communicating with their own colleagues.

www.numerons.in

Approaches to e-learning services

E-learning services have evolved since computers were first used in education. There is a trend to move towards blended learning services, where computer-based activities are integrated with practical or classroom-based situations.

Bates and Poole (2003) and the OECD (2005) suggest that different types or forms of e-learning can be considered as a continuum, from no e-learning, i.e. no use of computers and/or the Internet for teaching and learning, through classroom aids, such as making classroom lecture Powerpoint slides available to students through a course web site or learning management system, to laptop programs, where students are required to bring laptops to class and use them as part of a face-to-face class, to hybrid learning, where classroom time is reduced but not eliminated, with more time devoted to online learning, through to fully online learning, which is a form of distance education. This classification is somewhat similar to that of the Sloan Commission reports on the status of e-learning, which refer to web enhanced, web supplemented and web dependent to reflect increasing intensity of technology use. In the Bates and Poole continuum, 'blended learning' can cover classroom aids, laptops and hybrid learning, while 'distributed learning' can incorporate either hybrid or fully online learning.

www.numerons.in

It can be seen then that e-learning can describe a wide range of applications, and it is often by no means clear even in peer reviewed research publications which form of e-learning is being discussed. However, Bates and Poole argue that when instructors say they are using e-learning, this most often refers to the use of technology as classroom aids, although over time, there has been a gradual increase in fully online learning (see Market above).

Computer-based learning

www.numerons.in

Computer-based learning, sometimes abbreviated to CBL, refers to the use of computers as a key component of the educational environment. While this can refer to the use of computers in a classroom, the term more broadly refers to a structured environment in which computers are used for teaching purposes.

Cassandra B. Whyte researched about the ever increasing role that computers would play in higher education. This evolution, to include computer-supported collaborative learning, in addition to data management, has been realized. The type of computers have changed over the years from cumbersome, slow devices taking up much space in the classroom, home, and office to laptops and handheld devices that are more portable in form and size and this minimalization of technology devices will continue.

Computer-based training

www.numerons.in

Computer-Based Trainings (CBTs) are self-paced learning activities accessible via a computer or handheld device. CBTs typically present content in a linear fashion, much like reading an online book or manual. For this reason they are often used to teach static processes, such as using software or completing mathematical equations. The term Computer-Based Training is often used interchangeably with Web-based training (WBT) with the primary difference being the delivery method. Where CBTs are typically delivered via CD-ROM, WBTs are delivered via the Internet using a web browser. Assessing learning in a CBT usually comes in form of multiple choice questions, or other assessments that can be easily scored by a computer such as drag-and-drop, radial button, simulation or other interactive means. Assessments are easily scored and recorded via online software, providing immediate end-user feedback and completion status. Users are often able to print completion records in the form of certificates.

CBTs provide learning stimulus beyond traditional learning methodology from textbook, manual, or classroom-based instruction. For example, CBTs offer user-friendly solutions for satisfying continuing education requirements. Instead of limiting students to attending courses or reading printed manuals, students are able to acquire knowledge and skills through methods that are much more conducive to individual learning preferences. For example, CBTs offer visual learning benefits through animation or video, not typically offered by any other means.

www.numerons.in

CBTs can be a good alternative to printed learning materials since rich media, including videos or animations, can easily be embedded to enhance the learning. Another advantage to CBTs are that they can be easily distributed to a wide audience at a relatively low cost once the initial development is completed.

However, CBTs pose some learning challenges as well. Typically the creation of effective CBTs requires enormous resources. The software for developing CBTs (such as Flash or Adobe Director) is often more complex than a subject matter expert or teacher is able to use. In addition, the lack of human interaction can limit both the type of content that can be presented as well as the type of assessment that can be performed. Many learning organizations are beginning to use smaller CBT/WBT activities as part of a broader online learning program which may include online discussion or other interactive elements.

www.numerons.in

Computer-supported collaborative learning (CSCL)

Computer-supported collaborative learning (CSCL) is one of the most promising innovations to improve teaching and learning with the help of modern information and communication technology. Most recent developments in CSCL have been called E-Learning 2.0, but the concept of collaborative or group learning whereby instructional methods are designed to encourage or require students to work together on learning tasks has existed much longer. It is widely agreed to distinguish collaborative learning from the traditional 'direct transfer' model in which the instructor is assumed to be the distributor of knowledge and skills, which is often given the neologism E-Learning 1.0, even though this direct transfer method most accurately reflects Computer-Based Learning systems (CBL).

www.numerons.in

Locus of Control remains an important consideration in successful engagement of E-learners. According to the work of Cassandra B. Whyte, the continuing attention to aspects of motivation and success in regard to E-learning should be kept in context and concert with other educational efforts. Information about motivational tendencies can help educators, psychologists, and technologists develop insights to help students perform better academically.

Technology-enhanced learning (TEL)

Technology enhanced learning (TEL) has the goal to provide socio-technical innovations (also improving efficiency and cost effectiveness) for e-learning practices, regarding individuals and organizations, independent of time, place and pace. The field of TEL therefore applies to the support of any learning activity through technology.

Technology issues

www.numerons.in

Along with the terms learning technology, instructional technology, and Educational Technology, the term is generally used to refer to the use of technology in learning in a much broader sense than the computer-based training or Computer Aided Instruction of the 1980s. It is also broader than the terms Online Learning or Online Education which generally refer to purely web-based learning. In cases where mobile technologies are used, the term M-learning has become more common. E-learning, however, also has implications beyond just the technology and refers to the actual learning that takes place using these systems.

E-learning is naturally suited to distance learning and flexible learning, but can also be used in conjunction with face-to-face teaching, in which case the term Blended learning is commonly used. E-Learning pioneer Bernard Luskin argues that the "E" must be understood to have broad meaning if e-Learning is to be effective. Luskin says that the "e" should be interpreted to mean exciting, energetic, enthusiastic, emotional, extended, excellent, and educational in addition to "electronic" that is a traditional national interpretation. This broader interpretation allows for 21st century applications and brings learning and media psychology into the equation.

www.numerons.in

In higher education especially, the increasing tendency is to create a Virtual Learning Environment (VLE) (which is sometimes combined with a Management Information

System (MIS) to create a Managed Learning Environment) in which all aspects of a course are handled through a consistent user interface standard throughout the institution. A growing number of physical universities, as well as newer online-only colleges, have begun to offer a select set of academic degree and certificate programs via the Internet at a wide range of levels and in a wide range of disciplines. While some programs require students to attend some campus classes or orientations, many are delivered completely online. In addition, several universities offer online student support services, such as online advising and registration, e-counseling, online textbook purchase, student governments and student newspapers.

www.numerons.in

E-Learning can also refer to educational web sites such as those offering learning scenarios, worksheets and interactive exercises for children. The term is also used extensively in the business sector where it generally refers to cost-effective online training.

The recent trend in the E-Learning sector is screencasting. There are many screencasting tools available but the latest buzz is all about the web based screencasting tools which allow the users to create screencasts directly from their browser and make the video available online so that the viewers can stream the video directly. The advantage of such tools is that it gives the presenter the ability to show his ideas and flow of thoughts rather than simply explain them, which may be more confusing when delivered via simple text instructions. With the combination of video and audio, the expert can mimic the one on one experience of the classroom and deliver clear, complete instructions. From the learner's point of view this provides the ability to pause and rewind and gives the learner the advantage of moving at their own pace, something a classroom cannot always offer.

www.numerons.in

Communication technologies used in E-learning

Communication technologies are generally categorized as asynchronous or synchronous. Asynchronous activities use technologies such as blogs, wikis, and discussion boards. The idea here is that participants may engage in the exchange of ideas or information without the dependency of other participants involvement at the same time. Electronic mail (Email) is also asynchronous in that mail can be sent or received without having both the participants' involvement at the same time. Asynchronous learning also gives students the ability to work at their own pace. This is particularly beneficial for students who have health problems. They have the opportunity to complete their work in a low stress environment.

Synchronous activities involve the exchange of ideas and information with one or more participants during the same period of time. A face to face discussion is an example of synchronous communications. Synchronous activities occur with all participants joining in at once, as with an online chat session or a virtual classroom or meeting.

www.numerons.in

Virtual classrooms and meetings can often use a mix of communication technologies. Participants in a virtual classroom use icons called emoticons to communicate feelings and responses to questions or statements. Students are able to 'write on the board' and even share their desktop, when given rights by the teacher. Other communication technologies

available in a virtual classroom include text notes, microphone rights, and breakout sessions. Breakout sessions allow the participants to work collaboratively in a small group setting to accomplish a task as well as allow the teacher to have private conversations with his or her students.

In asynchronous online courses, students proceed at their own pace. If they need to listen to a lecture a second time, or think about a question for awhile, they may do so without fearing that they will hold back the rest of the class. Through online courses, students can earn their diplomas more quickly, or repeat failed courses without the embarrassment of being in a class with younger students. Students also have access to an incredible variety of enrichment courses in online learning, and can participate in college courses, internships, sports, or work and still graduate with their class.

www.numerons.in

In many models, the writing community and the communication channels relate with the E-learning and the M-learning communities. Both the communities provide a general overview of the basic learning models and the activities required for the participants to join the learning sessions across the virtual classroom or even across standard classrooms enabled by technology. Many activities, essential for the learners in these environments, require frequent chat sessions in the form of virtual classrooms and/or blog meetings.

Learning management system (LMS) and Learning content management system (LCMS)

A learning management system (LMS) is software used for delivering, tracking and managing training/education. LMSs range from systems for managing training/educational records to software for distributing courses over the Internet and offering features for online collaboration.

www.numerons.in

A learning content management system (LCMS) is software for authoring, editing and indexing e-learning content (courses, reusable content objects). An LCMS may be solely dedicated to producing and publishing content that is hosted on an LMS, or it can host the content itself. The Aviation Industry Computer-Based Training Committee (AICC) specification provides support for content that is hosted separately from the LMS.

A LMS allows for teachers and administrators to track attendance, time on task, and student progress. LMS also allows for not only teachers and administrators to track these variables but parents and students as well. Parents can log on to the LMS to track grades. Students log on to the LMS to submit homework and to access the course syllabus and lessons.

Computer-aided assessment

www.numerons.in

Computer-aided Assessment (also but less commonly referred to as E-assessment), ranging from automated multiple-choice tests to more sophisticated systems is becoming increasingly common. With some systems, feedback can be geared towards a student's

specific mistakes or the computer can navigate the student through a series of questions adapting to what the student appears to have learned or not learned.

The best examples follow a Formative Assessment structure and are called "Online Formative Assessment". This involves making an initial formative assessment by sifting out the incorrect answers. The author/teacher will then explain what the pupil should have done with each question. It will then give the pupil at least one practice at each slight variation of sifted out questions. This is the formative learning stage. The next stage is to make a Summative Assessment by a new set of questions only covering the topics previously taught. Some will take this even further and repeat the cycle such as BOFA which is aimed at the Eleven plus exam set in the UK.

www.numerons.in

The term learning design has sometimes come to refer to the type of activity enabled by software such as the open-source system LAMS which supports sequences of activities that can be both adaptive and collaborative. The IMS Learning Design specification is intended as a standard format for learning designs, and IMS LD Level A is supported in LAMS V2.elearning has been replacing the traditional settings due to its cost effectiveness.

Electronic performance support systems (EPSS)

Electronic performance support systems (EPSS) is a "computer-based system that improves worker productivity by providing on-the-job access to integrated information, advice, and learning experiences". 1991, Barry Raybould.

Content issues

www.numerons.in

Content is a core component of E-learning and includes issues such as pedagogy and learning object re-use.

Pedagogical elements

Pedagogical elements are an attempt to define structures or units of educational material. For example, this could be a lesson, an assignment, a multiple choice question, a quiz, a discussion group or a case study. These units should be format independent, so although it may be in any of the following methods, pedagogical structures would not include a textbook, a web page, a video conference or Podcast.

When beginning to create E-Learning content, the pedagogical approaches need to be evaluated. Simple pedagogical approaches make it easy to create content, but lack flexibility, richness and downstream functionality. On the other hand, complex pedagogical approaches can be difficult to set up and slow to develop, though they have the potential to provide more engaging learning experiences for students. Somewhere between these extremes is an ideal pedagogy that allows a particular educator to effectively create educational materials while simultaneously providing the most engaging educational experiences for students.

www.numerons.in

Pedagogical approaches or perspectives

It is possible to use various pedagogical approaches for eLearning which include:

- Social-constructivist – this pedagogy is particularly well afforded by the use of discussion forums, blogs, wiki and on-line collaborative activities. It is a collaborative approach that opens educational content creation to a wider group including the students themselves. The One Laptop Per Child Foundation attempted to use a constructivist approach in its project

- Laurillard's Conversational Model is also particularly relevant to eLearning, and Gilly Salmon's Five-Stage Model is a pedagogical approach to the use of discussion boards.

- Cognitive perspective focuses on the cognitive processes involved in learning as well as how the brain works.

- Emotional perspective focuses on the emotional aspects of learning, like motivation, engagement, fun, etc.

- Behavioural perspective focuses on the skills and behavioural outcomes of the learning process. Role-playing and application to on-the-job settings.

- Contextual perspective focuses on the environmental and social aspects which can stimulate learning. Interaction with other people, collaborative discovery and the importance of peer support as well as pressure.

- Mode Neutral Convergence or promotion of 'transmodal' learning where online and classroom learners can coexist within one learning environment thus encouraging interconnectivity and the harnessing of collective intelligence.

Reusability, standards and learning objects

Much effort has been put into the technical reuse of electronically-based teaching materials and in particular creating or re-using Learning Objects. These are self contained units that are properly tagged with keywords, or other metadata, and often stored in an XML file format. Creating a course requires putting together a sequence of learning objects. There are both proprietary and open, non-commercial and commercial, peer-reviewed repositories of learning objects such as the Merlot repository.

A common standard format for e-learning content is SCORM whilst other specifications allow for the transporting of "learning objects" (Schools Framework) or categorizing metadata (LOM).

www.numerons.in

These standards themselves are early in the maturity process with the oldest being 8 years old. They are also relatively vertical specific: SIF is primarily pK-12, LOM is primarily Corp, Military and Higher Ed, and SCORM is primarily Military and Corp with some Higher Ed. PESC- the Post-Secondary Education Standards Council- is also making headway in developing standards and learning objects for the Higher Ed space, while SIF is beginning to seriously turn towards Instructional and Curriculum learning objects.

In the US pK12 space there are a host of content standards that are critical as well- the NCES data standards are a prime example. Each state government's content standards and achievement benchmarks are critical metadata for linking e-learning objects in that space.

www.numerons.in

An excellent example of e-learning that relates to knowledge management and reusability is Navy E-Learning, which is available to Active Duty, Retired, or Disable Military members. This on-line tool provides certificate courses to enrich the user in various subjects related to military training and civilian skill sets. The e-learning system not only provides learning objectives, but also evaluates the progress of the student and credit can be earned toward higher learning institutions. This reuse is an excellent example of knowledge retention and the cyclical process of knowledge transfer and use of data and records.

Flexible learning

Flexible Learning is a set of educational philosophies and systems, concerned with providing learners with increased choice, convenience, and personalisation to suit the learner. In particular, flexible learning provides learners with choices about where, when, and how learning occurs. Sometimes also referred to as personalized learning. Flexible learning is a term often used in New Zealand and Australia see Shurville et al. (2008)

www.numerons.in

Flexible learning approaches are often designed using a full range of teaching and learning theories, philosophies and methods to provide students with opportunities to access information and expertise, contribute ideas and opinions, and correspond with other learners and mentors. This may occur through the use of internet-based tools such as Virtual Learning Environments (VLEs) or Learning Management Systems (LMSes), discussion boards or chat rooms; and may be designed as a "blended" approach, with content available electronically and remotely, as well as "face-to-face" classroom tutorials and lectures.

While the majority of flexible learning programs to date have taken advantage of computer-based systems ("E-learning"), the rapidly increase in the processing power and popularity of mobile digital devices has recently caused considerable interest in mobile learning - the use of mobile devices such as mobile phones, iPods, and Personal Digital Assistants (PDAs) to increase the mobility of learners and correspondingly enhance the flexibility of their learning.

www.numerons.in

Virtual learning environment

A virtual learning environment (VLE) is a system designed to support teaching and learning in an educational setting, as distinct from a Managed Learning Environment (MLE), where the focus is on management.

Overview

www.numerons.in

A student will normally work over the Internet and provide a collection of tools such as those for assessment (particularly of types that can be marked automatically, such as multiple choice), communication, uploading of content, return of students' work, peer assessment, administration of student groups, collecting and organizing student grades, questionnaires, tracking tools, etc. New features in these systems include wikis, blogs, RSS and 3D virtual learning spaces. VLEs are often used in schools and other educational establishments in order to make the learning experience more interactive.

While originally created for distance education, VLEs are now most often used to supplement traditional face to face classroom activities, commonly known as Blended Learning. These systems usually run on servers, to serve the course to students Multimedia and/or web pages.

In some programs, such as Elluminate, a virtual learning environment can be similar to a face-to-face classroom environment in that it allows direct communication with the teacher. Students can use emoticons to “raise their hand,” show that they are confused, show that they understand what the teacher is saying, and even give applause for something that the teacher says. Students are also able to talk to the teacher when called on. In many of these virtual learning environments the students are able to write on the “virtual classroom chalkboard.” This allows them to show their work for the rest of the class to see. Students can also be split up into groups in order to work with each other and discuss topics that the teacher introduces. Many virtual learning environments give teachers the ability to share multimedia files such as video and audio files as well as the ability to transfer important documents (Word, PDF,...etc.) directly to students.

www.numerons.in

In 'Virtually There', a book and DVD pack distributed freely to schools by the Yorkshire and Humber Grid for Learning Foundation (YHGfL), Professor Stephen Heppell writes in the foreword:

"Learning is breaking out of the narrow boxes that it was trapped in during the 20th century; teachers' professionalism, reflection and ingenuity are leading learning to places that genuinely excite this new generation of connected young school students — and their teachers too. VLEs are helping to make sure that their learning is not confined to a particular building, or restricted to any single location or moment."

www.numerons.in

Similar terms

A VLE is a computer program that facilitates computerized learning or e-learning. Such e-learning systems are sometimes also called Learning Management System (LMS), Content Management System (CMS), Learning Content Management System (LCMS), Managed Learning Environment (MLE), Learning Support System (LSS), Online Learning Centre (OLC), OpenCourseWare (OCW), or Learning Platform (LP); it is education via computer-mediated communication (CMC) or Online Education.

A more correct term may be a virtual environment for learning, rather than virtual learning environment. This removes any ambiguities and identifies that it is the environment which is virtual and not the learning. The term virtual may also contribute to confusion, suggesting that the learning is not real or authentic.

www.numerons.in

In the United States, CMS and LMS are the more common terms, however LMS is more frequently associated with software for managing corporate training programs rather than courses in traditional education institutions.

In the United Kingdom and many European countries, the terms VLE and MLE are favored; however, it is important to realize that these are two very different things. A VLE can be considered a subsystem of an MLE, whereas MLE refers to the wider infrastructure of information systems in an organization that support and enable electronic learning on a wider scale. In fact a rather pedantic reading of the term MLE could be extended to encompass the physical environment in which learning takes place (i.e. a school). Also the use of VLE avoids confusion with the use of LMS to mean "Library Management System" (which is more commonly referred to as Integrated Library System, or ILS, in the United States).

www.numerons.in

Becta, in the UK, have coined the term learning platform to cover both MLE and VLE as used in the schools sector. 'The term learning platform describes a broad range of ICT systems used to deliver and support learning. Through a learning platform, hardware, software and supporting services are brought together to enable more effective ways of working within and outside the classroom. At the heart of any learning platform is the concept of a personalized online learning space for the pupil. This space should offer teachers and pupils access to stored work, e-learning resources, communication and collaboration with peers, and the facility to track progress.'

Facilities

A VLE should make it possible for a course designer to present to students, through a single, consistent, and intuitive interface, all the components required for a course of education or training. Although logically it is not a requirement, in practice VLEs always make extensive use of computers and the Internet. A VLE should implement all the following elements:

www.numerons.in

- The syllabus for the course
- Administrative information including the location of sessions, details of pre-requisites and co-requisites, credit information, and how to get help

- A notice board for up-to-date course information
- Student registration and tracking facilities, if necessary with payment options
- Basic teaching materials. These may be the complete content of the course, if the VLE is being used in a distance learning context, or copies of visual aids used in lectures or other classes where it is being used to support a campus-based course.
- Additional resources, including reading materials, and links to outside resources in libraries and on the Internet.
- Self-assessment quizzes which can be scored automatically
- Formal assessment procedures
- Electronic communication support including e-mail, threaded discussions and a chat room, with or without a moderator
- Differential access rights for instructors and students
- Production of documentation and statistics on the course in the format required for institutional administration and quality control
- All these facilities should be capable of being hyperlinked together
- Easy authoring tools for creating the necessary documents including the insertion of hyperlinks - though it is acceptable (arguably, preferable) for the VLE to be designed allowing standard word processors or other office software to be used for authoring.

In addition, the VLE should be capable of supporting numerous courses, so that students and instructors in a given institution (and, indeed, across institutions) experience a consistent interface when moving from one course to another.

www.numerons.in

Popularity

Open University Support System

Universities and other institutions of higher and further education are increasingly turning to VLEs in order to:

- Economize on the time of teaching staff, especially when they are also involved in research and administration. The extent of the economy over traditional "talk-and-chalk" teaching is not yet clear, but for instructors without web development expertise, using a VLE absorbs less time and produces a more professional result.
- Provide a service for students who increasingly look to the internet as the natural medium for finding information and resources.
- Ensure that quality control requirements are met by providing a standard vehicle for collecting the required information
- Facilitate the integration of distance and campus-based learning or of learning on different campuses.

www.numerons.in

For example, accredited institutions such as Chapman College University, Touro University, and Adams State College offer online, on-demand teacher training courses for educators to earn graduate credit and/or masters degrees. In the UK schools are being encouraged to make use of learning platforms. The DCSF in the UK government has published an

eStrategy outlining priorities that include every learner in schools having access to an online learning space and e-portfolio.

Virtual learning environments also have become popular among younger students. Pennsylvania has a number of cyber charter schools available to offer students a choice in their education. The Pennsylvania Cyber Charter School is the largest one in Pennsylvania with an enrollment of 10,000 students from kindergarten through 12th grade.

www.numerons.in

Transferring course content

Most VLEs support Shareable Content Object Reference Model (SCORM) as a standard way to upload, launch and track courses. There are no commonly used standards that define how the learner's performance within a course should be transferred from one VLE to another.

Some institutions have attempted to combat this problem by agreeing to share content through open standards, such as those defined by the IMS Global Consortium. Local bodies such as in the schools sector in the UK the DCSF via Becta have additionall defined a learning platform "conformance framework" to encourage interoperability.

Virtual Learning Environments are not limited only to students and learners in graduate level studies. There are many virtual learning environments being created at all times, especially due to the increased popularity of online public education for students in grades k-12. One example of a virtual learning environment for some of the youngest learners is coined with the name: Little Lincoln. "Little Lincoln is an interactive and engaging standards-based curriculum that combines rich multimedia with comprehensive offline activities. Little Lincoln is currently offered for Early Kindergarten, Kindergarten, First Grade, and Second Grade students. Little Lincoln Third Grade will be available for the 2011-2012 academic year." This online learning environment allows for the students to utilize innovative technology while progressing through standards based curriculum. It is just one of many virtual learning environments available at this time.

www.numerons.in

The growth of online learning environments continues to grow as students in PA continue to choose charter schools. There appear to be a variety of reasons as to why students are choosing cyber school over traditional brick and mortar schools. The reasons vary from peer pressure to the need for flexibilty to health issues.

Systems available

For those wishing to deliver elearning there are many free open source and proprietary VLEs available for use. On-demand elearning services are also a popular choice because they can be deployed in minutes and do not require instructors and institutions to run their own servers.

www.numerons.in

Many VLEs are placed on a web server. In a typical VLE there are one or more programs or languages that provides the user (Teacher-Student) interface, and which interacts with a

database. For example, a VLE might use PHP as its web language/program, with MySQL as a database.

VLEs are increasingly found in new niches. These include new emerging technologies, as well as specialized markets. A VLE can be deployed on a USB drive as a child, which synchronizes from time to time with its web-based parent. VLEs can be used for training or in something as specialized as to meet ISO 9000 certification requirements.

www.numerons.in

Virtual world learning environments

Emerging technologies include Sloodle, a merge of Second Life and Moodle, which integrates virtual worlds and course management. This early development approach hints at new options for enabling learning in a social, immersive, and interactive way. Another 3D virtual learning environment called Edusim brings a lessons driven 3D virtual environment to the classroom interactive whiteboard surface allowing the direct manipulation of 3D virtual objects. Umgumbo is an immersive 3D VLE set in a Newtonian simulation of the solar system. Still in development, Umgumbo will allow collaborative and interactive learning within personalized 3D spaces, including educational gaming, and is delivered from a single external website.

Brain Based Learning and its application for the Virtual Learning Environment

Brain based learning or brain-compatible learning theory focuses on concepts that creat an optimal learning environment to maximize attainment and retention of information. Successful application is dependant upon everyone involved in the learning process - online course developers, educators and student to understand the structure of the brain and focus on student learner's needs and styles to create brain based learning environments, materials and instruction in a fun, meaningful, personally enriching way. (Lucas, 2004) Brain based learning is much better than traditional lecture techniques. However the teacher must be aware of how to implement the techniques into the online learning environment. “Designers of educational tools must be artistic in their creation of brain-friendly environments. Instructors need to realize that the best way to learn is not through lecture, but by participation in realistic environments that let learners try new things safely” (Funderstanding, 1998 -2008).

www.numerons.in

Proper Ways of Using Brain Based Learning in the Virtual Classroom

Brain based learning is a topic that is challenging teachers, administrators, and neuroscientists to see what is best for students. By providing specific feedback, stimulating environments, and real life examples to students they will be more engaged and active in the classroom. A major proponent of virtual schools is that they provide students with an environment that is effective to them. Funderstanding states, “Because every brain is different, educators should allow learners to customize their own environments” (Funderstanding, 1998 - 2008). By allowing the students and parents to choose the environment that is best for them. In addition, Crain states, “Children who developed a firm sense of trust in their caretakers can afford to leave them and independently explore the

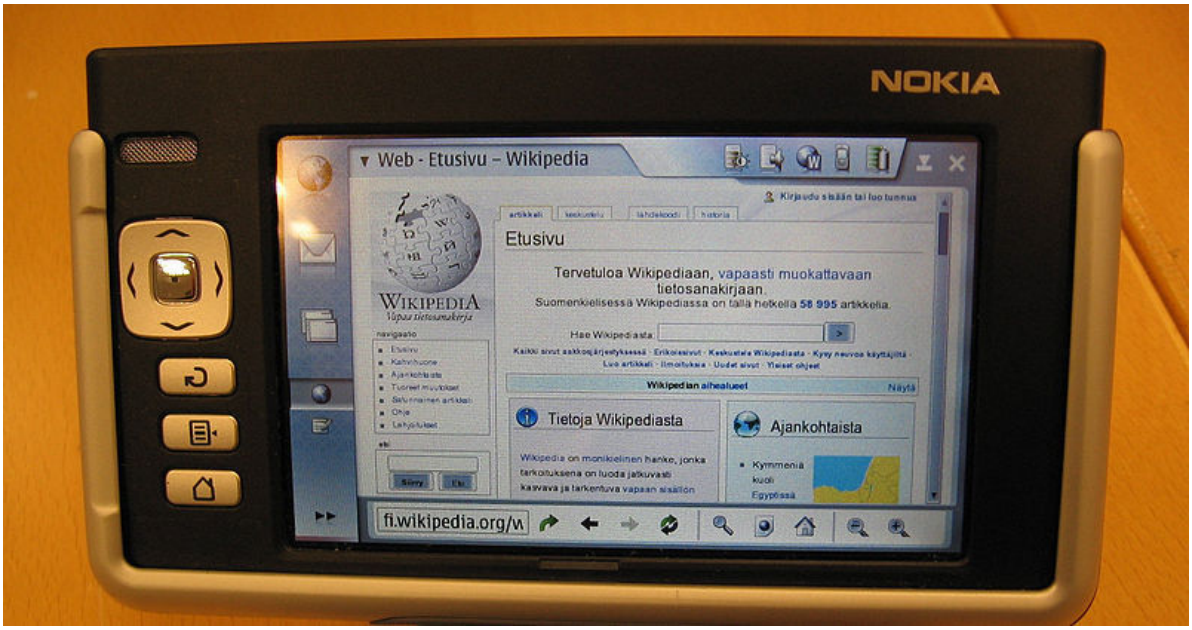
www.numerons.in

environment" (Crain, 1992). In the future, students will feel more comfortable to eventually leave their normal setting. Some students may be too nervous and anxious in a regular classroom so they are not learning.

The virtual classrooms also provide more technology features than a traditional school setting. Nellie states, "Technology can cater to these neuroscience brain-based findings in the computer lab as well as for online learning courses. Various Microsoft tools such as PowerPoint presentations, Excel, Word processor and other software with multimedia functions can be used by the teacher and students instead of using conventional outdated class tools" (Nellie Deutsch, 2003). One specific example that can used is a PowerPoint presentation for class. Creating an "About Me" lesson allows the students to express themselves through PowerPoint. By doing this the students were able to learn how to use PowerPoint to expand their learning.

www.numerons.in

MLearning



Wikipedia on Nokia 770 is an example of mobile learning

The term M-Learning, or "mobile learning", has different meanings for different communities. Although related to e-learning and distance education, it is distinct in its focus on learning across contexts and learning with mobile devices. One definition of mobile learning is: Any sort of learning that happens when the learner is not at a fixed, predetermined location, or learning that happens when the learner takes advantage of the learning opportunities offered by mobile technologies. In other words mobile learning decreases limitation of learning location with the mobility of general portable devices.

www.numerons.in

The term covers: learning with portable technologies including but not limited to handheld computers, MP3 players, notebooks and mobile phones. M-learning focuses on the mobility of the learner, interacting with portable technologies, and learning that reflects a focus on

how society and its institutions can accommodate and support an increasingly mobile population. There is also a new direction in MLearning that adds mobility of the instructor and includes creation of learning materials "on-the-spot, "in the field" using predominately smartphone with special software such as AHG Cloud Note. Using mobile tools for creating learning aides and materials becomes an important part of informal learning.

M-learning is convenient in that it is accessible from virtually anywhere. M-Learning, like other forms of E-learning, is also collaborative; sharing is almost instantaneous among everyone using the same content, which leads to the reception of instant feedback and tips. M-Learning also brings strong portability by replacing books and notes with small RAMs, filled with tailored learning contents. In addition, it is simple to utilize mobile learning for a more effective and entertaining experience.

www.numerons.in

History

Pre-1970s

Arguably the first instance of mobile learning goes back as far as 1901 when Linguaphone released a series of language lessons on wax cylinders. This was followed up in later years as technology improved, to cover compact cassette tapes, 8 track tape, and CDs.

1970s, 1980s

Alan Kay and his colleagues in the Learning Research Group at Xerox Palo Alto Research Center [PARC] propose the Dynabook as a book-sized computer to run dynamic simulations for learning. Their interim Dynabooks are the first networked workstations.

www.numerons.in

1990s

In May 1991, Apple Classrooms of Tomorrow (ACOT) in partnership with Orange Grove Middle School of Tucson, Arizona, use mobile computers connected by wireless networks for the 'Wireless Coyote' project. Universities in Europe and Asia develop and evaluate mobile learning for students. Palm corporation offers grants to universities and companies who create and test the use of Mobile Learning on the PalmOS platform. Knowledgility creates the first mobile learning modules for CCNA, A+ and MCSE certification using the core tools that later became LMA.

2000s

The European Commission funds the major multi-national MOBIlearn and M-Learning projects.

www.numerons.in

Companies were formed that specialize in three core areas of mobile learning.

- Authoring and publishing
- Delivery and Tracking

- Content Development

Conferences and trade shows were created to specifically deal with mobile learning and handheld education, including: mLearn, WMUTE, and IADIS Mobile Learning international conference series, ICML in Jordan, Mobile Learning in Malaysia, Handheld Learning in London, SALT Mobile in USA.

Analysis (costs / benefits, forecast)

www.numerons.in

Value

The value of mobile learning--Tutors commented on the value of mobile learning as follows.

- It is important to bring new technology into the classroom.
- It will be more light weight device compare to books, PCs, etc.
- Mobile learning could be utilised as part of a learning approach which uses different types of activities (or a blended learning approach).
- Mobile learning supports the learning process rather than being integral to it.
- Mobile learning needs to be used appropriately, according to the groups of students involved.
- Mobile learning can be a useful add-on tool for students with special needs. However, for SMS and MMS this might be dependent on the students' specific disabilities or difficulties involved.
- Good IT support is needed.
- Mobile learning can be used as a 'hook' to re-engage disaffected youth.
- It is necessary to have enough devices for classroom use.

www.numerons.in

Challenges

Technical challenges include

- Connectivity and battery life
- Screen size and key size
- Ability for authors to visualize mobile phones for delivery
- Possibilities to meet required bandwidth for nonstop/fast streaming
- Number of file/assets' formats supported by a specific device
- Content security or copyright issue from authoring group
- Multiple standards, multiple screen sizes, multiple operating systems
- Reworking existing e-Learning materials for mobile platforms

www.numerons.in

Social and educational challenges include

- Accessibility and cost barriers for end users: Digital divide.
- How to assess learning outside the classroom
- How to support learning across many contexts

- Content's security (or) pirating issues
- Frequent changes in device models/technologies/functionality etc.
- Developing an appropriate theory of learning for the mobile age
- Conceptual differences between e- and m-learning
- Design of technology to support a lifetime of learning
- Tracking of results and proper use of this information
- No restriction on learning timetable
- Personal and private information and content
- No demographic boundary
- Disruption of students' personal and academic lives
- Access to and use of the technology in developing countries

www.numerons.in

Growth

Over the past ten years mobile learning has grown from a minor research interest to a set of significant projects in schools, workplaces, museums, cities and rural areas around the world. The mLearning community is still fragmented, with different national perspectives, differences between academia and industry, and between the school, higher education and lifelong learning sectors.

Current areas of growth include:

- Testing, surveys, job aids and just-in-time (J.I.T.) learning
- Location-based and contextual learning
- Social-networked mobile learning
- Mobile educational gaming
- Deliver M-Learning to cellular phones using two way SMS messaging and voice-based CellCasting (podcasting to phones with interactive assessments)

www.numerons.in

According to a report by Ambient Insight in 2008, "the US market for Mobile Learning products and services is growing at a five-year compound annual growth rate (CAGR) of 21.7% and revenues reached $538 million in 2007. The data indicate that the demand is relatively immune from the recession." The findings of the report indicate that the largest demand throughout the forecast period is for custom development services, content conversion, and media services and that the healthcare sector accounts for 20% of the total US market for mobile learning.

Future

Technologies currently being researched for mobile learning include:

www.numerons.in

- Location aware learning
- Point-and-shoot learning with camera phones and 2D codes
- Near Field Communications (NFC) secure transactions
- Sensors and accelerometers in mobile devices in behavioral based learning
- Mobile content creation (including user generated content)

- Games and simulation for learning on mobile devices
- Context-aware ubiquitous learning
- Augmented reality on mobile devices

Delivery

While many think of mobile learning as delivering eLearning on small form factor devices, or often referred to as eLearning "lite", it has the potential to do much more than deliver courses, or parts of courses. It includes the use of mobile/handheld devices to perform any of the following:

- Deliver Education/Learning
- Foster Communications/Collaboration
- Conduct Assessments/Evaluations
- Provide Access to Performance Support/Knowledge
- Capture Evidence of Learning Activity

Smartphones are one of the platforms used for mobile learning.

Today, any number of portable devices can quickly and easily deliver and support these functions. Cell or smartphones, multi-game devices, personal media players (PMPs), personal digital assistants (PDAs), or wireless single-purpose devices can help deliver coaching and mentoring, conduct assessments and evaluations (e.g., quizzes; tests; surveys/polls; and certifications), provide on-the-job support and access to information, education and references, and deliver podcasts, update alerts, forms and checklists. In

these ways, mobile learning can enhance and support more traditional learning modes, making it more portable and accessible. Mobile devices can also serve as powerful data collection tools and facilitate the capture of user created content.

Approaches

www.numerons.in

The use of mobile learning in the military is becoming increasingly common due to low cost and high portability.

In the classroom

Students using handheld computers, PDAs, smartphones or handheld voting systems (such as clickers) in a classroom or lecture room (Tremblay 2010).

Students using mobile devices(such as a Pocket PC) in the classroom to enhance group collaboration among students and instructors.

For blended learning

Mobile learning can provide support that enhances training in a corporate business or other classroom environment.

Class management

www.numerons.in

The mobile phone (through text SMS notices) can be used especially for distance education or with students whose course requires them to be highly mobile and in particular to communicate information regarding availability of assignment results, venue changes and

cancellations, etc. It can also be of value to business people e.g. sales representatives who do not wish to waste time away from their busy schedules to attend formal training events.

Podcasting

Podcasting consists of listening to audio recordings of lectures, and can be used to review live lectures (Clark & Westcott (2007) and to provide opportunities for students to rehearse oral presentations. Podcasts may also provide supplemental information to enhance traditional lectures (McGarr 2009) (Steven & Teasley 2009).

www.numerons.in

Psychological research suggests that university students who download podcast lectures achieve substantially higher exam results than those who attend the lecture in person, but only in cases in which students take notes (Callaway & Ewen 2009).

Podcasts maybe be delivered using syndication, although it should be noted that this method of delivery is not always easily adopted (Lee, Miller & Newnham 2009).

Outdoor

- Learning in museums or galleries with handheld or wearable technologies
- Learning outdoors, for example on field trips.
- Continuous learning and portable tools for military personnel.

At work

www.numerons.in

On the job training for someone who accesses training on a mobile device "just in time" to solve a problem or gain an update.

Lifelong learning and self-learning

The use of personal technology to support informal or lifelong learning, such as using handheld dictionaries and other devices for language learning.

Mobile technologies and approaches, i.e. Mobile Assisted Language Learning (MALL), are also used to assist in language learning. For instance handheld computers, cell phones, but also podcasting (Horkoff Kayes2008) have been used for helping people to acquire a language.

Other

www.numerons.in

- Improving levels of literacy, numeracy and participation in education amongst young adults.
- Using the communication features of a mobile phone as part of a larger learning activity (e.g.: sending media or texts into a central portfolio, or exporting audio files from a learning platform to your phone)

Technologies

Mobile devices and personal technologies that can support mobile learning, include:

- E-book
- Handheld audio and multimedia guides, in museums and galleries
- Handheld game console, modern gaming consoles such as Sony PSP or Nintendo DS
- Personal audio player, e.g. for listening to audio recordings of lectures (podcasting)
- Personal Digital Assistant, in the classroom and outdoors
- Tablet PC
- UMPC, mobile phone, camera phone and SmartPhone

www.numerons.in

Technical and delivery support for mobile learning:

- 3GP For compression and delivery method of audiovisual content associated with Mobile Learning
- GPRS mobile data service, provides high speed connection and data transfer rate
- Wi-Fi gives access to instructors and resources via internet

Authoring:

Learning Mobile Author, e.g. for authoring and publishing WAP, Java ME and Smartphone

Relevant organisations

www.numerons.in

The International Association for Mobile Learning

The International Association for Mobile Learning (IAMLearn) has been formed as a membership organization to promote excellence in research, development and application of mobile and contextual learning. It organizes the annual mLearn international conference series. IAMLearn manages a website to collate and disseminate information about new projects, emerging technologies, and teaching resources.

Learning management system

A learning management system (commonly abbreviated as LMS) is a software application for the administration, documentation, tracking, and reporting of training programs, classroom and online events, e-learning programs, and training content. As described in (Ellis 2009) a robust LMS should be able to do the following:

www.numerons.in

- centralize and automate administration
- use self-service and self-guided services
- assemble and deliver learning content rapidly
- consolidate training initiatives on a scalable web-based platform
- support portability and standards

- personalize content and enable knowledge reuse.

LMSs range from systems for managing training and educational records, to software for distributing courses over the Internet with features for online collaboration. Corporate training use LMSs to automate record-keeping and employee registration. Student self-service (e.g., self-registration on instructor-led training), training workflow (e.g., user notification, manager approval, wait-list management), the provision of on-line learning (e.g., Computer-Based Training, read & understand), on-line assessment, management of continuous professional education (CPE), collaborative learning (e.g., application sharing, discussion threads), and training resource management (e.g., instructors, facilities, equipment), are dimensions to Learning Management Systems.

www.numerons.in

Some LMSs are Web-based to facilitate access to learning content and administration. LMSs are used by regulated industries (e.g. financial services and biopharma) for compliance training. They are also used by educational institutions to enhance and support classroom teaching and offering courses to a larger population of learners across the globe.

Some LMS providers include "performance management systems", which encompass employee appraisals, competency management, skills-gap analysis, succession planning, and multi-rater assessments (i.e., 360 degree reviews). Modern techniques now employ Competency-based learning to discover learning gaps and guide training material selection.

For the commercial market, some Learning and Performance Management Systems include recruitment and reward functionality.

www.numerons.in

Characteristics

LMSs cater to educational, administrative, and deployment requirements. While an LMS for corporate learning, for example, may share many characteristics with a VLE, or virtual learning environment, used by educational institutions, they each meet unique needs. The virtual learning environment used by universities and colleges allow instructors to manage their courses and exchange information with students for a course that in most cases will last several weeks and will meet several times during those weeks. In the corporate setting a course may be much shorter in length, completed in a single instructor-led event or online session.

The characteristics shared by both types of LMSs include:

- Manage users, roles, courses, instructors, facilities, and generate reports
- Course calendar
- Learning Path
- Student messaging and notifications
- Assessment and testing handling before and after testing
- Display scores and transcripts
- Grading of coursework and roster processing, including wait listing
- Web-based or blended course delivery

www.numerons.in

Characteristics more specific to corporate learning, which sometimes includes franchisees or other business partners, include:

- Auto enrollment (enrolling Students in courses when required according to predefined criteria, such as job title or work location)
- Manager enrollment and approval
- Boolean definitions for prerequisites or equivalencies
- Integration with performance tracking and management systems
- Planning tools to identify skill gaps at departmental and individual level
- Curriculum, required and elective training requirements at an individual and organizational level
- Grouping students according to demographic units (geographic region, product line, business size, etc.)
- Assign corporate and partner employees to more than one job title at more than one demographic unit

www.numerons.in

Technical aspects

Most LMSs are web-based, built using a variety of development platforms, like Java/J2EE, Microsoft .NET or PHP. They usually employ the use of a database like MySQL, Microsoft SQL Server or Oracle as back-end. Although most of the systems are commercially developed and have commercial software licenses there are several systems that have an open-source license.

www.numerons.in

Learning content management system (LCMS)

A learning content management system (LCMS) is a related technology to the learning management system in that it is focused on the development, management and publishing of the content that will typically be delivered via an LMS. An LCMS is a multi-user environment where developers may create, store, reuse, manage, and deliver digital learning content from a central object repository. The LMS cannot create and manipulate courses; it cannot reuse the content of one course to build another. The LCMS, however, can create, manage and deliver not only training modules but also manage and edit all the individual pieces that make up a catalog of training. LCMS applications allow users to create, import, manage, search for and reuse small units or "chunks" of digital learning content and assets, commonly referred to as learning objects. These assets may include media files developed in other authoring tools, assessment items, simulations, text, graphics or any other object that makes up the content within the course being created. An LCMS manages the process of creating, editing, storing and delivering e-learning content, ILT materials and other training support deliverables such as job aids.

www.numerons.in

Learning Management Systems compared to Learning Content Management Systems

Some systems have tools to deliver and manage instructor-led synchronous and asynchronous online training based on learning object methodology. These systems are

called Learning Content Management Systems or LCMSs. LCMSs provide tools for authoring and reusing or re-purposing content (mutated learning objects) MLO as well as virtual spaces for student interaction (such as discussion forums, live chat rooms and live web-conferences). Despite this distinction, the term LMS is often used to refer to both an LMS and an LCMS, although the LCMS is a further development of the LMS. Due to this conformity issue, the acronym CLCIMS (Computer Learning Content Information Management System) is now widely used to create a uniform phonetic way of referencing any learning system software based on advanced learning technology methodology.

www.numerons.in

In essence, an LMS is software for planning, delivering, and managing learning events within an organization, including online, virtual classroom, and instructor-led courses. For example, an LMS can simplify global certification efforts, enable entities to align learning initiatives with strategic goals, and provide a means of enterprise-level skills management. The focus of an LMS is to manage students, keeping track of their progress and performance across all types of training activities. It performs administrative tasks, such as reporting to instructors, HR and other ERP systems but isn't used to create course content.

By contrast, an LCMS is software for managing learning content across an organization's various training development areas. It provides developers, authors, instructional designers, and subject matter experts the means to create and re-use e-learning content and reduce duplicated development efforts. In the remote AICC hosting approach, an LCMS may host the content in a central repository and allow multiple LMSs to access it.

Primary business problems an LCMS solves are

www.numerons.in

- centralized management of an organization's learning content for efficient searching and retrieval,
- productivity gains around rapid and condensed development timelines,
- productivity gains around assembly, maintenance and publishing / branding / delivery of learning content.

Criticism of LMS is that it is content centric. in this sence the technology is used for organizational control rather than the empowerment of the learner. the platform is usually poor in it's content , it part of hierarchal bureaucratic (max weber) rather than socially oriented system. A/R/D/T is a term referring to it's implementation in complex organizations sometimes replacing regular web sites

Rather than developing entire courses and adapting them to multiple audiences, an LCMS provides the ability for single course instances to be modified and republished for various audiences maintaining versions and history. The objects stored in the centralized repository can be made available to course developers and content experts throughout an organization for potential reuse and repurpose. This eliminates duplicate development efforts and allows for the rapid assembly of customized content.

www.numerons.in

To look at this another way, an LMS is learner–centric. It focuses on e-learning process management and content delivery. In essence, an LMS is software for planning, delivering

and managing learning events within an organization, including online, virtual classroom, and instructor-led courses. For example, an LMS can simplify global certification efforts, enable entities to align learning initiatives with strategic goals and provide a means for enterprise-level skills management. The focus of an LMS is to manage students, keeping track of their progress and performance across all types of training activities. It performs administrative tasks, such as reporting to instructors, HR and other ERP systems but it isn't used to create course content.

www.numerons.in

An LCMS is content–centric. Here, the focus is on the authoring and management of e-learning reusable content.

By contrast, LCMS solutions are ideally suited to create content-centric learning strategies, supporting multiple methods for gathering and organizing content, leveraging content for multiple purposes, and operation for mission critical purposes. LCMS technology can either be used in tandem with an LMS, or as a standalone application for learning initiatives that require rapid development and distribution of learning content.

Rather than developing entire courses and adapting them to multiple audiences, an LCMS is designed for managing learning content across an organization's various training development areas. It provides developers, authors, instructional designers, and subject matter experts the means to create and re-use e-learning content and reduce duplicated development efforts. An LCMS provides the ability for single course instances to be modified and republished for various audiences maintaining versions and history. The objects stored in the centralized repository can be made available to course developers and content experts throughout an organization for potential reuse and repurpose. This allows for the rapid assembly of customized content.

www.numerons.in

In addition, Brandon Hall believes that: "when LCMS technology is appropriately applied and matched to an orchestrated e-learning strategy, with a complete instructional design plan for designing and using learning objects, great efficiencies can and will be achieved, such as:

- The ability to make instantaneous, company-wide changes to critical learning content
- Rapid and productive content development efforts
- Seamless collaboration among subject matter experts and course designers
- The ability to create multiple, derivative versions of content applicable to different audiences from senior management to line-level workers
- Access to find and reuse learning content, 'just-in-time' and 'just enough'
- Ultimate reusability of content by making it available through a wide array of output types such as structured e-learning courses, CD-ROM courses, learning material available from a Palm device or PocketPC, print-based learning for use in classroom settings, and so on."

www.numerons.in

Learning management industry

In the relatively new LMS market, commercial vendors for corporate and education applications range from new entrants to those that entered the market in the nineties. In addition to commercial packages, many open source solutions are available.

As reported in (Bersin et al. 2009), LMSs represent an $860 million market, made up of more than 60 different providers. The six largest LMS product companies constitute approximately 50% of the market. In addition to the remaining smaller LMS product vendors, training outsourcing firms, enterprise resource planning vendors, and consulting firms all compete for part of the learning management market. Approximately 40 percent of U.S. training organizations reported that they have an LMS installed, a figure that has not changed significantly over the past two years. The small business market offers the greatest opportunity for growth, as only 36 percent of these companies are using an LMS. Many of these businesses would like a low-cost, easy-to-use, easy-to-maintain system – but, as yet, they are not willing to make the commitment. An LMS is still a nontrivial investment in money and resources.

www.numerons.in

According to a 2009 report by American Society for Training and Development (ASTD) 91 percent of ASTD respondents are using LMS's in their organizations, with more than half purchasing rather than building their systems, and one-fifth of respondents opting to go with a hosted platform. And whether built or bought, the majority of respondents are satisfied with their current LMS, with 22.2 percent very satisfied, 31.1 percent satisfied, and 25.6 percent somewhat satisfied. Still, some 13.3 said they were unsatisfied, and 8.8 said they were very unsatisfied.

www.numerons.in

Most buyers of LMSs utilize an authoring tool to create their e-learning content, which is then hosted on an LMS. In many cases LMSs include a primitive authoring tool for basic content manipulation. For advanced content creation buyers must choose an authoring software that integrates with their LMS in order for their content to be hosted. There are authoring tools on the market, which meet AICC and SCORM standards and therefore content created in tools such as these can be hosted on an AICC or SCORM certified LMS. By May 2010, ADL had validated 301 SCORM-certified products while 329 products were compliant.

Trends

Another upcoming trend in this technology is 'Channel Learning' where organizations are sharing online contents and learning from their partner firms. According to a survey by trainingindustry.com, for many buyers channel learning is not their number one priority, but often there is a gap when the HR department oversees training and development initiatives, where the focus is consolidated inside traditional corporate boundaries. Software technology companies are at the front end of this curve, placing higher priority on channel trainings.

www.numerons.in

Today the biggest trend in the e-learning market is for these systems to be integrated with 'Talent Management Systems'. A talent management software serves towards the process of recruiting, managing, assessing, developing and maintaining an organization's most

important resources. Bersin research shows that in 2009 more than 70 percent of large companies have an LMS already and almost one third of these companies are considering replacing or upgrading these systems with integrated talent management systems.

www.numerons.in

www.numerons.in

www.numerons.in